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L7: Entry 1 of 3 File: USPT Mar 19, 2002

DOCUMENT-IDENTIFIER: US 6359892 B1
TITLE: Remote access, emulation, and control of office equipment, devices and services

Application Filing Date (1):
19971124

Brief Summary Text (2):
This invention is related to remote access of devices and more particularly describes a method and an apparatus for accessing the convenience, features and services of known office devices from a remote location.

Brief Summary Text (6):
Using an unfamiliar, unsecured device or set can also adversely affect safety and security where the remote person needs to transmit or receive information regarding the safe use of a machine or a chemical, and can adversely affect the financial success of a person or an employer, such as where the person needs to transmit or receive information or contact another persons regarding business or making an offer to supply or purchase services or material. Additionally, costs associated with processing internal (intra-enterprise) telephone calls, e-mails, faxes, and other information sharing and exchanging, are much lower than costs associated with processing such information externally. In addition, a person in an office, especially a person in management, will have access to financial and other information via servers in accounting, personnel, production, shipping, etc. Thus, information and communication are essential to safety and prosperity.

Brief Summary Text (7):
The traveling person will typically be exposed to many different environments and devices, in hotels, in remote offices, and while using commercial or private transportation. Operating procedures and commands cannot simply provide a standard, permanent set of procedures and commands because devices are constantly being improved to provide additional features, and because a permanent set of procedures and commands would have to be designed for a complex device or set, possibly contemplating features that are not even in existence, would generally be unnecessarily complex or cumbersome for a similar, simpler device, or a device which provided fewer features.

Brief Summary Text (14):
Therefore, the problem to be solved is how to provide a user with the ability to remotely access and use all the services and/or devices available at the user's office and/or the corporate enterprise, or at the user's home, regardless of where the user is currently located, and regardless of what equipment or devices are present at the remote location, just as though the user was still in his/her local office or at home.

Brief Summary Text (22):
The present invention allows a user at a first location, such as a remote location, to access devices at a second location, such as a base location. The first location may be any remote location, such as a remote office, a hotel, home, an airplane, the beach, a boat, a car, etc. The second location may be any base location, such

as the main office, a branch office, a home, etc. The steps, which are executed by a portable communications device used by the user, include presenting a plurality of representations, where each of the representations corresponds to a predetermined one of the devices at the second location, accepting a user selection of a representation, establishing a communications link with the second location, presenting an image or images of devices, applications, servers, etc., represented by the representation which was selected, accepting user selection of a device function represented by the image, sending the user selection of the device function to the second location, receiving a result from the second location, the result representing a response of the selected device to the user selection of the device function, and updating the image to display the result to the user.

Detailed Description Text (3):
The present invention allows the user at a remote location, such as a hotel in a different country, to use his portable communications device 10 to access the persons, services, information and devices at any of these points, regardless of where the user is located, and without the user having to know the peculiarities of dialing from the remote location or the telephone equipment at the remote location. In the preferred embodiment, the portable communications device 10 is a portable or laptop computer with a fax-modem, includes an internal microphone and speaker, and has a connector for connecting an external microphone and speaker, such as a handset. The fax-modem, along with application software in the portable communications device 10, provides for facsimile, voice, and data transmission and reception. It should be understood that "data" includes any information that may be sent digitally, such as video, pictures, sounds, music, business records, charts, graphs, etc. It should also be understood that voice may be transferred either conventionally, as an analog signal, or digitally, such as by a voice over data protocol, the voice over Internet Protocol, or other protocols. In the preferred embodiment, the fax-modem provides multi-media support and is an internal or integral modem, but an external modem or plug-in modem card may also be used. Also, the modem is preferably used with software that provides for simultaneous voice and data transmission.

Detailed Description Text (12):
The controller 225, via an associated modem, or via an associated Internet Protocol (IP) voice/data separator, can separate the voice from the data, send the voice portion to the PBX via lines 223 for further routing and connection, and operate upon the data portion. Alternatively, these devices may be located in or associated with the PBX 216, in which case the PBX 216 will coordinate and control the separation of the voice from the data, the transmission of the data portion to the controller 225, and the routing or connection of the voice portion as specified by the calling party. The controller 225 may also have other modems or direct trunks for communicating with other equipment which is responsive to DTMF instructions sent over lines 218 and 223. The controller 225 also preferably has a CTI software application. This allows the controller 225 to communicate with the PBXs 212, 216, and with other devices connected to the lines 223, so that the controller 225 can receive commands from, and send commands to, the PBXs 212, 216 and devices 10, 213, 215, 217, 221, and 230. This enables the controller 225 to provide or command desired telephony functions, such as conferencing, placing on hold, transferring, calling, answering, and other functions which are available via the PBXs 212, 216, just as if the commands or functions were issued by or implemented by a local telephone set 217 directly connected to the PBX 216. The controller 225 can receive commands from the remote communications device 10, convert these commands into CTI commands, and send the CTI commands to the appropriate device, such as the PBX 216. Likewise, the controller 225 can receive CTI status information from devices, convert this information into the desired format, and send it to the remote communications device 10 for display or action, as appropriate. A variety of CTI-like protocols or interfaces may be used, such as Telephony Application Programming Interface (TAPI.TM.) by Microsoft, Telephony Server Application Programming Interface (TSAPI) by Novell, IBM Callpath, or Dialogic's CTCONNECT.TM., etc. Some

of these protocols may be communicated via ISDN lines, rather than via conventional data lines.

Detailed Description Text (17):
Most homes, offices, and hotels have analog telephone lines and a telephone set to which the user can connect his communication device 10. However, digital telephone lines, such as ISDN, T1, and E1 are available from the telephone companies. Further, cable, such as cable TV, can provide an even higher speed communications link 11. ISDN, T1, E1, and cable communications links 11 to a home or a hotel room are well within the state of the art. Cost is the only limitation. Further, the user may have personal access to other communications links 11, such as cellular service, satellite, personal communications service (PCS), or other wireless services. A communications link 11 may, by itself, provide a direct connection to the controller 225 or several different independent communications links may combine to provide the desired connection to the controller 225. Thus, even though the present invention is described as using a telephone line and being connected to the office via an Internet link, it should be understood that this is simply a choice based upon the present availability and cost of different types of communications links 11, which is a factor controlled by economics, not by technology. Therefore, the present invention should be understood as being used with any type of communications link 11, and not limited to telephone lines and Internet links.

Detailed Description Text (18):
Assume now that the user is traveling and is in a hotel room and that the hotel room has a telephone set 211 which is connected to a remote PBX/ACD or other telephone system or switch 212 of the hotel. The hotel PBX 212 is connected to a remote telephone company 213. Items 212 and 213 are "remote" in that they are not located locally with respect to the main office 13. They are generally "local" to the user in the hotel. In the preferred environment of the present invention, the telephone 211 has two ports, 211A and 211B. Port 211B is a telephone port that connects the telephone set 211 to the PBX 212. Port 211A allows a computer, such as a portable communications device 10, to place and receive telephone calls and to transfer data over the telephone line via the PBX 212. Such telephone sets 211 are now commercially available. However, many hotels, offices, and residences use telephone sets which have only a single port. If only single port telephones are available then a splitter or coupler may be used. Also, a hotel or office may provide a second telephone outlet, having either the same extension number as the telephone 211 or a different extension number as the telephone 211. In the present invention, the portable communications device 10 is connected to the port 211A of the telephone set 211. The portable communications device 10 could, instead, connect directly to a port, such as an analog or ISDN port, on the PBX 212, or via a wireless connection directly to a remote wireless service provider, such as a cellular PCS. The portable communications device computer 10 is preprogrammed with certain information, described in more detail below.

Detailed Description Text (30):
Similarly, the portable communications device 10 can receive incoming calls directed to the local extension of the user. If the controller 225 and the portable communications device 10 are connected and an incoming call occurs for the local extension (for example, 217A) of the user then, if the user has so specified, the controller 225 will send a "ring" signal to the portable communications device 10. If automatic number identification (ANI) or caller ID is available the controller 225 sends, and the local device 10 displays, the telephone number (ANI, caller ID) and name (caller ID) of the calling party 12. For convenience, ANI and caller ID are sometimes collectively referred to as simply ANI. Of course, as explained in U.S. Pat. No. 4,797,911, the ANI or caller ID information may be used by the controller 225 to access a server or database and obtain more information about the caller, such as the caller's address, business, recent orders, payment history, etc. The user then uses the remote device 10 to instruct the controller 225 whether

the user wishes to receive the incoming call. If so, then the controller 225 causes the PBX 216 to route the call via the ISP, or other communications link, to the remote device 10, whereby the user can then answer the incoming call. The user can also use the remote device 10 to refuse the incoming call, send the incoming call to another extension or to a mailbox, etc.

Detailed Description Text (40):
Note that the communications between the remote device 10 and the controller 225 can be established directly at the controller 225 or through a PBX 216 and/or other corporate device 220 which is connected to the controller 225.

Detailed Description Text (41):
In a similar manner, from the screen shown in FIG. 3, the user may choose other equipment by selecting and opening the folder for that equipment. For example, the user may retrieve the user's facsimile messages by selecting the facsimile server represented by the folder 309A. An image (not shown) of the facsimile server will then appear on the screen of the portable communications device. The user then clicks on the proper buttons on the image of the facsimile server, or selects the proper instructions from a pulldown menu, to instruct the facsimile server to show a list of the facsimile messages that have been received and are addressed to the user, select and download one or more of these messages to the portable communications device 10, upload new messages from the portable communications device 10 to the facsimile server for immediate or later transmission. In a similar manner, the user may retrieve his e-mail by selecting the folder 313. Therefore, whatever corporate facilities that the user can access while in the office, and whatever operations that the user can perform using these facilities, while the user is in the office using his telephone or his desktop computer 221, the user can access, and the user can perform, and in the same way, using the remote device 10 while away from the office.

Detailed Description Text (43):
Assume now that the user has used the office facilities to call another person, has completed the conversation, and that the called party 12, but not the user, has now hung up. In the preferred embodiment the PBX 216 has been programmed to hang up the line to the called party when the called party 12 hangs up. However, the user may wish to maintain the connection with the controller 225 even after the called party 12 has hung up so that the user can, via the controller 225, call another party, check the voicemail, check for or send an e-mail message or a facsimile message, etc. Therefore, the PBX 216 or controller 225 does not necessarily or automatically terminate the connection to the user. Rather, the PBX 216 or controller 225 only terminates the connection to the user if the user issues a "terminate session" command, unplugs the remote device 10 from the network, or the central office 215 advises the PBX 216 that the user or the controller 225 has hung up.

Detailed Description Text (54):
In one implementation of the present invention a controller 225 will be installed at each company office site location. For security reasons, full utilization of the services of a controller 225 at a particular office may be used only by the authorized users/employees of that site. If a user from another company site calls into the controller 225 then the controller 225 will, in that case, connect the user with the controller 225 at the user's home office. For example, if an Atlanta user/employee is in Tokyo, and the Tokyo office is equipped with a controller 225, the Atlanta user can call into the Tokyo office, and the Tokyo controller 225 will connect the Atlanta user with the Atlanta controller 225. Also, the Atlanta user 225 may directly connect to the Atlanta controller 225, such as by using an Internet connection or a dial-up connection. In either case, once the Atlanta user is connected with the Atlanta controller 225, the Atlanta controller 225 will send, to the controllers at the other sites, the commands necessary to implement the tasks instructed by the Atlanta user. For example, the Atlanta user in Tokyo may call the Tokyo controller 225, which will connect the Atlanta user to the Atlanta

controller 225. Using the device 10 in the manner described herein, the user will then instruct the Atlanta controller 225 to set up a conference call to a first person in Tokyo and to a second person in London. The Atlanta controller 225 will then instruct the Tokyo controller 225 to set up a call to the first person, and instruct the London controller 225 to set up a call to the second person. The Atlanta controller 225 will then cause the parties to be conferenced together. The conferencing function may be performed by the Atlanta controller and PBX, or the Atlanta controller may instruct the London controller to forward the connection to the second party to the Tokyo controller 225, and also instruct the Tokyo controller 225 to cause the Tokyo PBX to conference together the Atlanta user, the first party in Tokyo, and the second party in London. Thus, by using established inter-office links, or the Internet, between the various office sites, all calls are local access calls. Therefore, depending upon the facilities available, and the costs involved, the Atlanta controller 225 will select the connections necessary to perform the desired function at the most economical rate.

Detailed Description Text (55):
Certain users, such as high-ranking corporate officers, may have access to full utilization of the services of a controller 225 at an office site even if that user is not an employee of that site. In this case it will be appreciated that different office sites will have different equipment and facilities, and that these different devices may require different commands to accomplish the same task. For example, the exact commands to the PBX 216 in Tokyo to set up a call to a party 12 may be different than the exact commands to PBX 216 in London to set up the call, or the exact commands to the PBX 216 in Atlanta to set up the call. Therefore, where the business has multiple office sites and multiple controllers, PBXs, corporate devices, etc., then, upon connection with the controller 225 at the called office site, the device 10 will send to that controller 225 a list of the device types that the user has at the user's office. For example, if an Atlanta user calls the Tokyo controller 225 then, in response to receiving the list of device types, the controller 225 will consult a profile table to establish the relationship between the commands sent by the portable communications device 10 and the commands necessary to properly operate the local Tokyo PBX 216. Thus, the Atlanta user is not required to be connected with the Atlanta office location in order to use equipment functionally similar or identical to that available at the Tokyo office location.

Detailed Description Text (60):
The present invention also provides for use with "proxy agents" to provide transparency of operation for the remote user. The proxy agent at the user's home office provides communicates with all of the local equipment and services and translates remote messages to those used by local devices and services. The proxy agent at the remote device 10 provides local service/device emulation or presentation via communications with the home proxy agent. This allows different proxy agents to be used for a variety of services or devices at multiple locations. It also allows for different types of agent proxy functions. One type is where the user is using a device 10 to access the services and features of the home office location 13. Another type is where the user has no device 10 with him so the user, using a conventional telephone 211, establishes a voice call into the user's home office 13 and, through a series of DTMF tones or voice commands, the user instructs the PBX 216 to put parties on hold, establish a new call, verbally read the user's e-mail to the user, etc. The agent proxies of this type may also be installed into the device 10 so that, if the user has the device 10, the user may use voice and/or DTMF commands and receive his e-mail verbally. Thus, a variety of agent proxies may be installed into the device 10 to interface with the agent proxies at the several office locations.

Detailed Description Text (70):
In step 715 the controller executes any command not described above. For example, the command may be to disconnect from a remote controller at another site.

Detailed Description Text (73):
As technology advances, and as costs decline, portable communication devices 10 will become more and more compact, and functionality will increase. If size, weight and cost were not factors, one embodiment of the portable communications device 10 would include a cellular and/or a satellite communications transceiver, including applications support for various wireless communications protocols. The use of cellular and/or satellite for the communications link, instead of the conventional wire-based telephone system, provides for complete mobility, regardless of the location of the user. However, in another, lower cost embodiment, the portable communications device 10 of FIG. 1 is simply a laptop computer without audio capability, with only GUI displays for selected equipment and telephones, and with reduced user profile information.

Detailed Description Text (76):
A typical laptop has two PCMCIA (Personal Computer Memory Card International Association) card slots, where one slot is used to house a fax/modem device and the other slot is used to house a network interface card (NIC), i.e., TCP/IP device, which connects the laptop to the network facilities of the main office 13. Additionally, a video connector is provided to allow for connection to an external monitor and provide a larger viewing screen. So a typical laptop is used at the office, via the NIC interface, to access all resources of the enterprise which are available on the office network. The modem/fax connection provides the same access when the user is away from the office.

Detailed Description Text (78):
Because the user, while in the office, can control and have access to both information and telephony functions from his computer (221) instead of using his telephone set (217) while in the office, corporate services may be securely extended to remote site, where the client applications software, running in device (10) is the same software running in the office computer (221), thus assuring that the person traveling could use a different computer while in the office than when on the road.

Detailed Description Text (86):
When a user wishes to use his telephone the user can select the "My Telephone" folder 305, as shown in FIG. 3. In response, the device 10 will present a graphical user interface (GUI) display of the user's telephone set 217A, as shown in FIG. 5. The telephone set 505 shown in FIG. 5 is an example of a typical electronic telephone. In one embodiment, the device 10 has a GUI display for a variety of different telephone types and manufacturers. In the same manner and with the same ease as selecting a printer on a network, the user can, at any point, specify the particular make and model of telephone set at the main office 13 and the device 10 will present a GUI display which is representative of the actual telephone set 217A. The device 10 may have a plurality of GUI displays, or may only have a GUI display for the telephone set 217A which is used by the user when the user is in the office 13. If additional GUI displays are needed in order to present the user's telephone, then such displays may be stored in controller 225 and downloaded by the remote device 10 when desired or needed.

Detailed Description Text (88):
Now, as the user's telephone set profile is present in the device 10, the user only needs to establish a communications link 11 to/from the remote device. The user can then, as shown in FIG. 4, select and log on to the desired communications link 11. Of course, passwords and security procedures are preferably employed by the device 10, by the communications link 11, and by the controller 225. For example, the desired (or available) communications link 11 may be the Internet, satellite service, cellular service, a corporation communications server for "intranet" access, a standard long distance carrier, etc. Depending upon the location and the communications links available, the user may need to provide or select the country,

area code, remote PBX's local or long-distance access codes for situations where dial-up telephone service is used, etc., also as shown in FIG. 4. In one embodiment, the user will initiate a single dial-up link to an ISP, and establish communications with the controller 225, which in turn provides for both voice and data to be communicated over the Internet using voice over IP or another communications protocol.

Detailed Description Text (95):
CTI applications allow system integrators and application developers to custom develop the functions and features of a call center or customer care center. CTI applications are continually emerging and developing and allow the user to directly control more and more of the features of the PBX/ACD 216. Several CTI standards exist today. Possibly the most commonly used CTI standard is TAPI. TAPI supports "First Party Control", which allows a computer 221 or device 10 connected, via a network connection such as TCP/IP or Internet, to a TAPI server with CTI drivers, such as the controller 225, to perform many of the functions available to a telephone set 217, such as originating/dialing telephone calls, performing call transfers, establishing multi-party conference calls, screening incoming calls, etc. TAPI also supports "Third Party Control", which allows an application (typically server-based, such as the controller 225, and with a CTI interface) to control incoming and outbound call routing, such as to designated sets of agents, to perform outbound automated call campaigns, etc. Other CTI support applications are also available, such as CallPath.TM. from IBM, and CTCONNECT.TM. from Dialogic.

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L7: Entry 2 of 3 File: USPT Mar 27, 2001

DOCUMENT-IDENTIFIER: US 6208266 B1
TITLE: Remote data acquisition and processing system

Application Filing Date (1):
19970428

Brief Summary Text (3):
The present invention relates generally to a distributed, information gathering and processing system, and more specifically, to such a system for remotely acquiring and processing data related to a phenomenon or phenomena being monitored by metering devices. Although the present invention has particular usefulness in the area of acquiring and processing utility service consumption and/or distribution information, and will be described in connection with same, other uses are contemplated for the present invention, including remote acquisition and processing of data from distributed pollution monitoring devices for use e.g. in pollution analysis and/or control applications, remote acquisition and processing of information related to vending machine usage and/or operation, and other uses.

Brief Summary Text (14):
Another conventional outbound system is disclosed in Sollinger, U.S. Pat. No. 4,811,011. The Sollinger system includes a sensor at each customer's premises for automatically reading the customer's meters, a microcomputer for accepting and storing the data from the sensor, a communications interface connected to the microcomputer, a main computer at a location remote from the customer's premises, and a communications link between the customer's premises and the main computer, wherein the main computer continually polls each customer's meter to initiate transmission of the reading data to the remote location over the communications link. The Sollinger system further comprises means for periodically transmitting the reading data to utility company computers for billing purposes. Unfortunately, in this system, the main computer must continually poll each customer premises rather than having the utility usage data sent automatically from the customer premises to the main computer. Also, disadvantageously, this system is unable to automatically read non-machine-readable meters, and is only able to automatically read machine-readable meters.

Brief Summary Text (29):
Preferably, the transmission of the image data from the optical imaging devices to the controllers is accomplished via wireless communications links between the controllers and the devices. The wireless communications links may comprises spread-spectrum radio frequency links (e.g., transmitting at between 902 and 928 MHz), although other types of communications links (e.g., cellular telephone, hardwired telephone network, cable television connections, integrated services data network, microwave, and/or satellite communications links) may also be used without departing from this embodiment of the present invention.

Brief Summary Text (30):
Transmission of image data between the controllers and the host processor in this embodiment is accomplished via a public or private communications network connecting the controllers to the host processor. Preferably, this network takes the form of a wide area computer network, such as an Internet computer network,

through which the controllers and the host processor exchange data via appropriate hardware and software (e.g., modems, communications software, etc.), and telecommunications facilities (e.g., public and/or private switched data and/or telecommunications networks). The host processor and controllers may also be appropriately provisioned to connect to the wide area network via wireless means, such as Unlicensed National Information Infrastructure (U-NII) communications devices operating within a frequency spectrum located at 5.15 to 5.35 GHz and 5.725 to 5.825 GHz.

Drawing Description Text (20):
FIG. 21 is a functional block diagram of the spread spectrum radio frequency transmission/reception device of the optical imaging device of FIG. 19, which transmission/reception device is substantially identical to that of the remote management controller/processor of FIG. 20.

Drawing Description Text (30):
FIG. 30 is a functional block diagram of a preferred construction of the wide area network interface system of the remote management controller/processor of FIG. 20.

Detailed Description Text (10):
Referring now to FIG. 4, a block diagram of CIM 14 is shown utilizing a cellular telephone network. In this embodiment, RMP 12 is equipped with modem 30, such as a Rockwell RC144ACL/C40, configured for use with a cellular telephone network. Modem 30 then transmits the data to cellular tower 48A using a modem-ready cellular transceiver. Next, the data is sent from local call interface 48B to telephone company central office 16 through inter-cellular connection 48C. The data is then sent to SFS 24 through a virtual connection over wide band link 20.

Detailed Description Text (11):
Referring now to FIG. 5, a block diagram of CIM 14 is shown utilizing RF. In this embodiment, RMP 12 is equipped with modem 30 configured to control an RF transceiver which transmits the data using radio frequency waves to either RF remote location 53A, a fixed RF site, or vehicle 54, a mobile RF site. If RF remote location 53A is used, the data is then sent through the RF site 53B and telephone line 26 to the telephone company central office 16 and ultimately to SFS 24 over wide band link 20. In a mobile configuration, data collection by the mobile van is downloaded to SFS 24 via disk, tape or other means, as determined by the particular RF system employed.

Detailed Description Text (34):
FIG. 17 illustrates an embodiment of modem 30 adapted for use with a cable television network, an RF network, or an ISDN network. The circuitry is essentially identical to that described in connection with FIG. 16. Connection to the cable, television, RF or ISDN service interface is accomplished through connector 186 using standard 4-wire serial protocols. Transformer 188 is used to provide differential drive for transmit in order to increase common mode rejection to the network interface.

Detailed Description Text (37):
System 300 also includes at least one 338, and preferably a plurality 338, 340 of remote management controllers/processors. Each of the remote controllers 338, 340 controls separate pluralities of optical imaging devices 316, 318, 320 and 322, 324, 326, respectively, at each of the customer premises 301, 302, via control signals transmitted to each of the optical imaging devices via separate respective primary wireless communications links 328, 334 between the controllers 338, 340 and the scanners. Preferably, controllers 338, 340 are located in relatively inaccessible places (e.g.,. mounted atop conventional telephone poles). Preferably, as will be described in greater detail below, communications links 328, 334 each comprise separate spread-spectrum radio frequency communications links between each of the controllers and each of the scanners of each of the respective pluralities

of scanners controlled by the controllers, each of which radio frequency links comprises two respective reception/transmission devices 377, one of said devices being located in a respective optical scanner and the other of which devices being located in the respective remote management controller/processor responsible for controlling that respective optical scanner. In this embodiment, controller 338 is adapted to be able to control each of the scanners 316, 318, 320 in the plurality of scanners 316, 318, 320 controlled by controller 338 independently of the other scanners in the plurality of scanners 316, 318, 320 controlled by controller 338. Likewise, controller 340 is adapted to be able to control each of the scanners 322, 324, 326 of the plurality of scanners 322, 324, 326 controlled by controller 340 independently of the other scanners in the plurality of scanners 322, 324, 326 controlled by controller 340.

Detailed Description Text (38):
As will be described in greater detail below, in embodiment 300, each of the scanners 316, 318, . . . 326 is adapted to optically scan the display means of the face portion 315, 317, 319, 321, 323, 325 of the respective meter 308, 306, 304, 310, 312, 314 to which it is attached, based upon control signals supplied thereto via wireless communications links 328, 334 from remote management controllers/processors 338, 340, in order to produce respective computer-readable (i.e., digital) image data of the display means 500 and the aforesaid visual representations being generated by the display means. Once generated, the image data is transmitted from the scanner or scanners generating same, along with respective scanner identifying information (e.g., scanner serial number information), via the appropriate wireless link 328 or 334 to the respective controller 338 or 340 responsible for controlling the scanner or scanners which generated the image data. The image data is then temporarily stored, in association with the identifying information, in the controller or controllers such that respective portion(s) of image data generated by the respective scanner(s) is associated with the respective identifying information of the scanner(s) that generated same, and thence, the image data and associated identifying information are transmitted to a remote host computer processor 344 via public or private wide area network 342, which network 342 connects the controllers 338, 340 and the host processor 344. Host processor 344 is geographically remotely located from the customer premises 301, 302, meters 308, 306, 304, 310, 312, 314, scanners 316, 318, 320, 322, 324, 325, controllers 338, 340, and utility company computer 346. Network 342 preferably comprises a Internet-type of public, wide area computer network wherein data exchange is accomplished via Transmission Control Protocol/Internet Protocol (TCP/IP), although alternatively, network 342 may comprise other types of public and/or private communications networks, including public or private telecommunications or telephone networks. Host processor 344 is also connected to utility computer(s) 346 via network 342.

Detailed Description Text (52):
While controller 384 is in sleep mode, controller 384 periodically generates control signals for causing switch 356 to be in a state wherein RF device 377 is activated and initializes the RF device 377 (in a manner that will be described in greater detail below), so as to permit reception of signals being transmitted to the RF device 377 via the appropriate wireless link from the remote management controller/processor responsible for controlling the optical imaging device of which the RF device 377 is a part. Any such received signals are processed by the RF device (in the manner that will be described below in connection with the specific construction and operation of the RF device 377) to convert same into digital data bit stream useable by the controller 384, which bit stream is transmitted to the controller 384 via the connector 376.

Detailed Description Text (54):
Microcontroller 370 is programmed (via appropriate program code stored in memory 372) to decode the data stream whereby to determine which commands are present in the data stream, and whether those commands are intended to be executed by the

optical imaging device of which the microcontroller 370 is a part (e.g., whether the remote management controller/processor issuing the commands is the one responsible for controlling the optical imaging device receiving such commands and, if so, whether such commands identify the optical imaging device receiving such commands as being required to execute same).

Detailed Description Text (55):
As noted previously, such commands may include commands to the optical imaging device receiving such commands from the remote management controller/processor responsible for the device to generate and transmit image data representative of the meter face to which the device is attached. If such commands are determined by the microprocessor 370 to be present in the data stream supplied to the microprocessor 370 from the controller 384, microcontroller 370 generates control signals causing switch 362 to power-up optical scanning system 364, and also for causing optical scanning system 364 to generate the image data representative of the meter face and to transmit such image data to the microcontroller 370, in the manner described more fully below. Preferably, switch 362 is only commanded by the microprocessor 370 to permit flow of power to the optical scanning system 364 when it is desired to generate such image data. The microcontroller 370 then transmits the image data (and identifying data discussed more fully below) to the controller 384, which transmits the image data to the RF device 377 via the subconnector 376. RF device 377 then converts (in the manner described more fully below) the image data into spread spectrum transmission signals which are transmitted to the remote management controller/processor responsible for controlling the optical imaging device of which the device 377 is a part. Microprocessor 370 then transmits control signals to the RF device 377 via the controller 384 and connector 376 to cause the RF device 377 to switch to a reception mode from its previous transmission mode.

Detailed Description Text (56):
Once the remote management controller/processor intended to receive the spread spectrum transmission signals representative of the image data actually does receive (and processes, in manner described more fully below) such signals, the remote management controller/processor transmits spread spectrum signals indicative of such receipt together with spread spectrum signals indicative of the optical imaging device from which the spread spectrum signals representative of the image data was received. The RF device 377 of the optical imaging device receives such receipt acknowledgment signals from the remote management controller/processor, processes them (in the manner described more fully below) to produce a data bit stream representative of such signals, and transmits the bit stream to the controller 384 via the connector 376. The controller 384 transmits the bit stream to the controller 370, which controller 370 is programmed to decode the bit stream to determine therefrom that remote management controller/processor to which the spread spectrum signals indicative of the image data was transmitted has received same. The microcontroller 370 then completes execution of any other commands received from the remote management controller/processor responsible for controlling the optical imaging device of which the microcontroller 370 is a part, and thereafter, signals the controller 384 that processing of all such commands has been completed.

Detailed Description Text (62):
As will be appreciated by those skilled in the art, the control signals applied to the image area gate of the sensor 452 select which of the pixel image lines of the sensor array 452 is imaged to generate image signals (indicative of the strength of light incident to the pixels of the selected image line), which image signals are transferred to the serial register (not shown) of the sensor 452. The control signals applied to the serial register gate of the sensor 452 cause the image signals currently present in the serial register to be serially transferred (via an output amplifier, which is not shown) to the buffer and pre-amplifier 460 circuitry, which circuitry 460 appropriately conditions for analog to digital conversion by the microprocessor 370. The control signals applied to the image area

and serial register gates of the sensor 452 by the microprocessor 370 are adapted to cause each image line of the sensor 452 to be sequentially imaged, the image signals generated thereby to be transferred to the serial register of the sensor 452, and to cause the image signals transferred to the serial register to be transmitted to the micro-controller 370 for analog to digital conversion and transmission as image data representative of the meter face to the remote management controller responsible for commanding the optical imaging device to generate such image data.

Detailed Description Text (63):
Preferred construction and operation of the spread spectrum RF reception/transmission device 377 will now be described. It should be noted at the outset that although not shown expressly in FIG. 21 for purposes of clarity, various of the functional components shown in FIG. 21 should be understood as comprising various filtering, decoupling, impedance matching, noise choking, logic level adjusting networks, as needed, to permit the device 377 to operate in the manner described herein. As shown in FIG. 21, RF device 377 includes a transmission/reception controller/processor 600 connected to transmission network 65, reception network 646, and phase-locked loop (PLL) 644. Processor 600 preferably comprises an Intellon CELinx RF Spread Spectrum Carrier.TM. RF transceiver chip, which is clocked by a 25.2 MHz crystal oscillator 602.

Detailed Description Text (64):
As will be explained more fully below, device 377 is a simplex type of transceiver, and is designed such that the antenna 622 (which preferably is designed to be primarily resonant at the central frequency of the spread spectrum signals intended to be transmitted and received by the device 377, i.e., 915 MHz in this embodiment, and have a 50 ohm characteristic impedance at this primary resonance frequency, although the antenna 622 may be designed to be primarily resonant and have said characteristic impedance at other frequencies, e.g., 926 MHz) may only be in either a transmit mode or a receive mode at any given time. Processor 600 is able to control whether the antenna 622 is in transmit or receive mode by generating signals for controlling the state of transmit/receive mode selector switch 618. Switch 618 preferably comprises a conventional Motorola MRFIC0903 Broadband GaAs Switch. Depending upon the state of the switch 618, either the output of the transmission network 650 or the input of the reception network 646 is connected to the antenna 622 via impedance matching network 620 (e.g., comprising a plurality of discrete microstrip paths, and one or more inductors and/or capacitors, and designed to provide impedance matching at the primary resonance frequency of the antenna 622 between the output impedance of the switch 618 and the input impedance of the antenna 622). It is important to note that in the absence of either control signals from the processor 600 or supply of power from the source 350 (via the switch 356, converter 358, and connector 376), switch 618 will cause the antenna 622 to be in receive mode (i.e., the antenna 622 will be connected to the reception network 646 via the network 620).

Detailed Description Text (85):
The output signal from the converter 354 also used by the controller 384 to permit the controller 384 to determine based upon the strength of such signal whether the power source is in a low power state (i.e., output power from the source 350 has decreased to a level of 2.19 volts. If such a low power state is determined to exist, the controller 384 transmits data via device 377 to the remote controller/processor responsible for controlling the imaging device of which the controller 384 indicating that the controller 384 has sensed a low power condition. Upon receipt of such data, the remote controller/processor reports this information to the host processor 344 so as to permit appropriate human intervention to be initiated to correct the low power condition. Alternatively, controller 384 may be programmed to signal such low power condition when the sensed voltage level falls below 1.6 to 2 volts, and to transmit data indicating such low power condition to the remote controller/processor every time the optical imaging device of which the

controller 384 is a part scans the meter to which said device is attached. Further alternatively, if modified in ways apparent to those skilled in the art, the microprocessor 370 (rather than the controller 384) may be adapted to determine whether a low power condition exists, and to report same in the manner discussed above.

Detailed Description Text (88):
In a similar fashion, microcontroller 370 may be programmed to ascertain the age of electronic components of RF device 377 critical to proper tuning of the device 377 (e.g., reference clock 602), and to use this age information to adjust the spread spectrum transmission and reception frequencies to which the device 377 is tuned so as to ensure that the device 377 is in fact tuned to transmit and receive at the nominal spread spectrum central frequency to which it is desired to be set. This may be accomplished by programming controller 384 to maintain a running clock of elapsed time since installation at the customer site of the imaging device of which the controller 384 is a part, and by storing in memory 372 a look-up table of calibration information relating the age of such components to expected drift in transmission/reception frequency calibration tuning of the RF device 377 resulting therefrom. Microcontroller 370 is programmed via appropriate program code contained in the program memory 372 to determine (based upon the age of the aforesaid electronic components, and the drift in tuning calibration expected to result therefrom stored in the memory look-up table) to command the controller 384 to adjust the spread spectrum transmission and reception frequencies to which the device 377 is tuned by controlling the synthesizer to generate feedback control signals which appropriately adjust the frequency of the signals output by the VCO, in order to ensure that the RF device 377 is in fact tuned to transmit and receive at the aforesaid nominal spread spectrum frequencies to which it is desired to be set.

Detailed Description Text (90):
Upon receipt of this interrupt request signal from the switch 499, controller 384 is programmed to begin processing of an interrupt handler routine stored in program memory 372, which routine includes among its processing steps, causing the controller 384 to return to normal (i.e., non-low power consumption) processing mode, if prior to receipt of the interrupt request signal from the switch 499, controller 384 was in low power mode, and powering up the microcontroller 370, data memory means 374 and RF reception/transmission device 377 by appropriately controlling the power control switches 356 and 360 to supply power to these components, in the manner described previously. Once these components have been powered up, the controller 384 transmits to the microprocessor 370 appropriate signals for indicating to the microprocessor 370 that the collar portion 800 has been removed from engagement with the face portion 315 of the meter 308. In response to these signals from the controller 384, the microcontroller 370 commands the controller 384 to cause the transmission/reception device 377 to transmit to the remote controller/processor 338 that controls the optical imaging device 316, of which the microcontroller 370 is a part, signals indicative of such removal along with the optical imaging device's identifying information.

Detailed Description Text (92):
Turning now to FIGS. 20, 35, and 36, a preferred construction and operation of remote controllers 338, 340 will now be described. It should be appreciated at the outset that unless stated to the contrary, the various functional components of the controllers 338, 340 are substantially identical to the functional components of like reference numerals in optical imaging devices 316, 318, 320, 322, 324, 326. As shown in FIG. 20, in each controller 338, 340, the optical scanning system 364 of the optical imaging devices is replaced with a wide area network interface system 400. Preferably, system 400 comprises conventional means 422 (e.g., including Rockwell RC224ATFPPLCC 2400 Baud modem configured in a conventional two-wire telephony direct access arrangement to interface with network 342) for permitting the microprocessor 370 to communicate and exchange data with the host processor 344

via wide area network 342. Preferably, microcontroller 370 only permits power to be supplied to the system 400 via switch 362 when microcontroller 370 is actively communicating with host processor 344.

Detailed Description Text (94):
In each controller 338, 340, controller 384 preferably is programmed to put the remote management controller of which the controller 384 is a part into reduced power consumption mode when, for example, no information is being transmitted or received from the host processor 344, another remote management controller, or optical imaging device. When these conditions are determined to exist by the microcontroller 384, the microcontroller 384 informs the processor 370 that the controller 384 is ready to put the remote management controller of which the controller 384 is a part into such mode. In response, the processor 370 saves its current program status and related data in memory 374, and informs the microcontroller that same has been carried out.

Detailed Description Text (95):
Once the controller 384 receives this information from the processor 370, the controller 384 controls switches 356 and 360 to deactivate the RF device 377, microprocessor 370, and memories 372, 374. This causes system 400 to also be deactivated since microprocessor 370 is deactivated. Once this has been carried out, the controller 384 places itself into sleep mode, wherein it periodically powers-up the RF device 377 to ascertain whether messages are being sent from any of the optical imaging devices over which the remote management controller comprising the controller 384 has control. If such messages are received, the controller 384 powers up the components necessary to process such messages (and inform the host processor 344, if necessary). Otherwise, the controller 384 maintains these components in a deactivated state.

Detailed Description Text (98):
In response, the controller 384 causes the RF device 377 to transmit such scanning commands to the optical imaging devices from which such scanning is requested, using essentially the same transmission process described above in connection with the optical imaging devices, except that the identifying information provided in the transmission is that of the remote controller transmitting such commands, and information is included in such commands indicating that only those optical imaging devices specifically indicated in the transmission are to generate image data of the respective meter faces to which they are attached. The controller 384 of the remote controller transmitting these commands then causes the RF device 377 of the remote controller to switch into reception mode. When this transmission from the remote controller is received by the imaging devices, it is processed as described above, and the imaging devices transmit to the image data to the remote controller requesting same.

Detailed Description Text (99):
Once the respective image data are received and processed by the RF device 377 of the remote controller requesting same, the image data are transmitted to the controller 384, which stores them in memory 374 association with the respective identifying information of the respective imaging device that produced the data. Processor 370 then retrieves the data in association with the respective identifying information, and transmits the data in association with the respective identifying information to the host processor 344 via the system 400 and network 342.

Detailed Description Text (102):
As shown in FIG. 31, host processor 344 preferably comprises wide area network data transmission/reception interface 516 (which preferably comprises a Microsoft Internet Information Server.TM.-based system), which interfaces the host processor 344 to the network 342 whereby to permit data exchange via the network 342 between the host processor 344 and the controllers 338, 340, and between the host processor

344 and the utility company computer(s) 346. Image data and associated scanner identifying information transmitted from the controllers 338, 340 to the host processor 344 via the network 342 are first received at the host processor 344 by the interface 516. Interface 516 then signals receipt of such data to the administration controller 514, which then issues commands to the interface 516 to transmit the received image data and associated scanner identifying information to network/data base data converter 500, which converter 500 translates the image data and associated scanner identifying information from the data transmission format (e.g., a TCP/IP compatible format, such as file transfer protocol or hypertext transfer protocol) used in the network 342 to the data storage format (e.g., Microsoft SQL format) used in the database 502. After being translated into the data format appropriate for storage in the database 502, the image data and associated scanner identifying information are then transmitted to the database 502 which stores the image data and associated scanner identifying information. Preferably, the database 502 also contains a data file wherein each of the meter scanning devices 316, 318, 320, 322, 324, 326 is associated by its identifying information with information related to the respective utility meter (e.g., the respective make, model, type of utility service being measured by the meter, utility customer whose service is being monitored by the respective meter, and utility company to which the meter readings are to be sent) being scanned by each of the scanning devices. Once the image data and associated scanner identifying information are stored in the database, the administration controller 514 commands the database to associate, based upon the aforesaid data file and the scanner identifying information associated with the image data stored in the database, the respective portions of the image data stored in the database with the aforesaid types of respective information related to the particular utility meters from which the respective portions of image data were generated. The database 502 then stores the respective portions of image data in data files wherein the respective portions of image data are associated with the aforesaid types of respective information related to the particular utility meters from the respective portions of image data were generated.

Detailed Description Text (109):
Report files stored in the database 502 may also be accessed on demand by the utility companies whose operations are being monitored by system 300. For example, when a given utility company wishes to access report files associated with its operation stored in the database 502, the utility company may generate a request for such access in its computer system 346, which system 346 then transmits the request to the host processor 344 (together with any required security information, such as access passwords, etc.) via the network 342. Once transmitted to the host processor 344 via the network 342, the request is first received at the interface server 516, which transmits the request to the administration controller 514. The controller 514 then verifies any required security information, and if the requested access is authorized based upon such verification, controller 514 commands database 502 to transmit to the converter 500 the record files requested by the utility 346. Converter 500 then converts the requested record files to the form appropriate for transmission over the network 342, and transmits the converted record files to the interface server 516. Upon receipt of the converted record files, server 516 signals same to the controller 514, which controller 514 then commands the server 516 to transmit the converted record files via the network 342 to the utility company computer 346 that issued the request for such files.

Detailed Description Text (110):
Alternatively, a given utility company wishing to access report files associated with its operation stored in the database 502 may contact personnel (not shown) operating the host processor 344 via conventional means (e.g., conventional telephone service, not shown). Such personnel may then use user interface means 512 to command administration controller 514 to command database 502 to transmit the requested report files to the converter 500. The converter 500 then converts the requested record files to the form appropriate for transmission over the network

342, and transmits the converted record files to the interface server 516. Upon receipt of the converted record files, server 516 signals same to the controller 514, which controller 514 then commands the server 516 to transmit the converted record files via the network 342 to the utility company computer 346 of the utility company that requested such files.

Detailed Description Text (113):
It should also be understood that alternatively, a user may select one or more optical imaging devices for demand reads via commands issued at user interface 512 or remotely from the utility computer 346 via network 342, which commands cause administration controller 514 to command page initiation via initiator 508 of those remote controller(s) responsible for the selected imaging device. Preferably, the utility computer 346 includes means (not shown) for permitting the image data to be displayed in the form of one or more computer-generated images of the respective meter face or faces from which the image data was obtained.

Detailed Description Text (115):
Thus, it is evident that there has been provided a remote data acquisition and monitoring system that fully satisfies both the aims and objectives hereinbefore set forth. Although the present invention has been described in connection with preferred embodiments and methods of use, it will be apparent to those skilled in the art that many variations, modifications, and alternatives thereof are possible without departing from the present invention. For example, although the present invention has been described in connection with preferred embodiments for use in monitoring and controlling utility service usage and/or consumption of utility services by utility customers, it should be understood that the present invention is not intended to be limited to such preferred embodiments and uses. Rather, it should be understood that if appropriately modified in ways apparent to those skilled in the art, the above-described embodiments of the present invention may be used in other remote data acquisition and processing applications, such as remote acquisition and processing of data obtained from distributed pollution metering devices for use e.g. in pollution analysis and/or control applications, remote acquisition and processing of information gathered from metering devices which generate data related to vending machine usage and/or operation, and other uses.

Detailed Description Text (116):
Additionally, as shown in FIG. 18, a wireless communications link (also of the spread-spectrum radio frequency type, and of the same construction as that of links 328, 334) 336 may also be provided between controllers 338, 340 for permitting each of the controllers 338, 340 to ascertain whether the other controller is functioning properly. Preferably, each one of the controllers 338, 340 periodically transmits a predetermined "ping" or inquiry signal via the link 336 to the other controller which, if the other controller is functioning properly, causes the other controller to transmit a predetermined response signal via the link 336 to the controller that transmitted the inquiry signal. If after a predetermined number of transmissions of the inquiry signal, no response signals or incorrect response' signals are received from the controller to which such inquiry signals were sent by the controller transmitting the inquiry signals, the controller transmitting the inquiry signals assumes that the controller to which the inquiry signals were transmitted has failed, signals this failure condition via the wide area network 342 to the remote host computer processor 344. Host processor 344 may then transmit to the controller a number of predetermined inquiry signals for generating predetermined responses by the failed controller for verifying (in a manner similar to that used by the controller signaling the failure condition to the host processor) whether the failed controller has in fact failed, or whether other conditions exist which have given rise to signaling of the failure condition to the host processor (e.g., failure of the controller signaling the failure condition to the host processor). If the controller's failure condition is verified by the host processor, the host processor may inform via the user interface 512 personnel (not shown) operating the system 300 of the failure of the failed controller, so as to

permit such personnel to undertake steps to correct such failure condition in the failed controller, transmit control signals to the failed controller to deactivate same, and transmit control signals to a normally functioning controller that is closest to the failed controller to cause the normally functioning controller to assume the role of a backup or redundant controller relative to the failed controller (i.e., assume the control and image data processing functions of the failed primary controller). Redundant wireless communications links (also of the spread-spectrum radio frequency type, and of the same construction as that of links 328, 334) 330, 332 may be provided between controller 340 and imaging devices 316, 318, 320, and between controller 338 and imaging devices 322, 324, 326, respectively, to permit controller 338 to assume the role of a backup controller relative to controller 340 in event of failure of controller 340, and to permit controller 340 to assume the role of a backup controller relative to controller 338 in event of failure of controller 338.

Detailed Description Text (119):
Also alternatively, if appropriately modified in ways apparent to those skilled in the art, the modem means of the remote controllers 338, 340, and the interface means 516 of the host processor 344, may be replaced with appropriate U-NII communications devices for permitting wireless exchange of data between the controllers 338, 340 and host processor 344 at frequencies located between 5.15 and 5.35 GHz or 5.725 and 5.825 GHz.

Detailed Description Text (131):
Likewise, each of the optical imaging devices may be adapted to determine upon booting up or awaking whether it is desired for the imaging device to undertake an initialization of its communications with a remote mangagement controller/processor. This determination may be made based upon whether predetermined flags in the imaging device's memory have set (e.g, at time of manufacture, which flags are changed after such initialization), or whether the imaging device has been moved from a previous control region (e.g., by comparing previous readings stored in memory and generated by a conventional global positioning system (not shown) comprised within the imaging device with current readings provided by the global positioning system). If such initialization is determined to be desired, the optical imaging device may "listen" in its geographic area using its device 377 for polling by one of the controllers 338, 340 for changes in the imaging devices in its control region, and when the imaging device determines that such polling has occurred, the imaging device may negotiate as described above with that controller and be included in the controller's list of imaging devices being controlled by that controller, whereafter the imaging device enters sleep mode. If, however, such initialization is not desired, the imaging device may "listen" via its device 377 for commands from the remote management controller/processor with which it last negotiated. If such commands are not forthcoming after a predetermined number of "listening" time outs, the imaging device may be adapted to seek out redundant controller by which to be controlled, in the manner described more fully above, whereafter the imaging device may enter sleep mode.

Other Reference Publication (2):
Intellon; "Technical Data Sheet--SSC R400 RF Network Interface Controller"; Aug. 1996; pp. 1-40; Intellon.

Other Reference Publication (9):
Intellon Corporation; "CELinx rf Spread Spectrum Carrier RF Transceiver"; 1995; pp. 1-15; Intellon Corporation.

CLAIMS:

2. A data acquisition and processing system comprising at least one optical imaging device for generating computer-readable image data of a visual representation

generated by a metering device of data related to at least one phenomenon being monitored by said metering device, and a host computer processor remotely located from said optical imaging and metering devices, said host processor being for generating the data related to said phenomenon from said image data and also for storing said image data, the system further comprising,

at least one controller for generating control signals for controlling generation of said image data by said at least one optical imaging device and for gathering said image data generated by said imaging device for transmission to said host processor,

a wireless communications link between said at least one controller and said imaging device for permitting transmission of said control signals from said at least one controller to said optical imaging device and transmission of said image data to said at least one controller, and wherein said at least one controller is also for transmitting image data received from said optical imaging device to said host processor,

said wireless communications link comprising one radio transmission/reception device included in said at least one controller and another radio transmission/reception device included in said at least one imaging device,

each of said transmission/reception devices comprising a phase-locked loop for generating output signals for being mixed with received radio signals for facilitating generation of incoming data signals and also for being mixed with outgoing data signals for facilitating generation of radio signals to be transmitted, said phase-locked loop having a voltage controlled oscillator for generating said output signals and a phase detector for generating feedback control signals for controlling frequency of the output signals generated by said oscillator, said phase detector including an electronically programmable frequency synthesizer for generating said feedback control signals based upon reference clock signals, said output signals, and digital control signals supplied to said synthesizer.

3. A data acquisition and processing system comprising at least one optical imaging device for generating computer-readable image data of a visual representation generated by a metering device of data related to at least one phenomenon being monitored by said metering device, and a host computer processor remotely located from said optical imaging and metering devices, said host processor being for generating the data related to said phenomenon from said image data and also for storing said image data, the system further comprising,

at least one controller for generating control signals for controlling generation of said image data by said at least one optical imaging device and for gathering said image data generated by said imaging device for transmission to said host processor,

a wireless communications link between said at least one controller and said imaging device for permitting transmission of said control signals from said at least one controller to said optical imaging device and transmission of said image data to said at least one controller, and wherein said at least one controller is also for transmitting image data received from said optical imaging device to said host processor,

said wireless communications link comprising one radio transmission/reception device included in said at least one controller and another radio transmission/reception device included in said at least one imaging device,

each of said transmission/reception devices comprising a phase-locked loop for generating output signals for being mixed with received radio signals for

facilitating generation of incoming data signals and also for being mixed with outgoing data signals for facilitating generation of radio signals to be transmitted, said phase-locked loop having a voltage controlled oscillator for generating said output signals and a phase detector for generating feedback control signals for controlling frequency of the output signals generated by said oscillator, said phase detector including an electronically programmable frequency synthesizer for generating said feedback control signals based upon reference clock signals, said output signals, and digital control signals signals supplied to said synthesizer, and

each of said at least one imaging device including a microprocessor for generating said digital control signals whereby to permit said microprocessor to control generation of said feedback control signals by said synthesizer.

4. A data acquisition and processing system comprising at least one optical imaging device for generating computer-readable image data of a visual representation generated by a metering device of data related to at least one phenomenon being monitored by said metering device, and a host computer processor remotely located from said optical imaging and metering devices, said host processor being for generating the data related to said phenomenon from said image data and also for storing said image data, the system further comprising,

at least one controller for generating control signals for controlling generation of said image data by said at least one optical imaging device and for gathering said image data generated by said imaging device for transmission to said host processor,

a wireless communications link between said at least one controller and said imaging device for permitting transmission of said control signals from said at least one controller to said optical imaging device and transmission of said image data to said at least one controller, and wherein said at least one controller is also for transmitting image data received from said optical imaging device to said host processor,

said wireless communications link comprising one radio transmission/reception device included in said at least one controller and another radio transmission/reception device included in said at least one imaging device,

each of said transmission/reception devices comprising a phase-locked loop for generating output signals for being mixed with received radio signals for facilitating generation of incoming data signals and also for being mixed with outgoing data signals for facilitating generation of radio signals to be transmitted, said phase-locked loop having a voltage controlled oscillator for generating said output signals and a phase detector for generating feedback control signals for controlling frequency of the output signals generated by said oscillator, said phase detector including an electronically programmable frequency synthesizer for generating said feedback control signals based upon reference clock signals, said output signals, and digital control signals supplied to said synthesizer,

each of said at least one imaging device including a microprocessor for generating said digital control signals whereby to permit said microprocessor to control generation of said feedback control signals by said synthesizer, and

each of said at least one imaging device including a temperature sensor, and said microprocessor being adapted to control the generation of said feedback control signals by said synthesizer based at least partially upon temperature sensed by said sensor.

5. A data acquisition and processing system comprising at least one optical imaging

device for generating computer-readable image data of a visual representation generated by a metering device of data related to at least one phenomenon being monitored by said metering device, and a host computer processor remotely located from said optical imaging and metering devices, said host processor being for generating the data related to said phenomenon from said image data and also for storing said image data, the system further comprising,

at least one controller for generating control signals for controlling generation of said image data by said at least one optical imaging device and for gathering said image data generated by said imaging device for transmission to said host processor,

a wireless communications link between said at least one controller and said imaging device for permitting transmission of said control signals from said at least one controller to said optical imaging device and transmission of said image data to said at least one controller, and wherein said at least one controller is also for transmitting image data received from said optical imaging device to said host processor,

said wireless communications link comprising one radio transmission/reception device included in said at least one controller and another radio transmission/reception device included in said at least one imaging device,

each of said transmission/reception devices comprising a phase-locked loop for generating output signals for being mixed with received radio signals for facilitating generation of incoming data signals and also for being mixed with outgoing data signals for facilitating generation of radio signals to be transmitted, said phase-locked loop having a voltage controlled oscillator for generating said output signals and a phase detector for generating feedback control signals for controlling frequency of the output signals generated by said oscillator, said phase detector including an electronically programmable frequency synthesizer for generating said feedback control signals based upon reference clock signals, said output signals, and digital control signals supplied to said synthesizer,

each of said at least one imaging device including a microprocessor for generating said digital control signals whereby to permit said microprocessor to control generation of said feedback control signals by said synthesizer,

each of said at least one imaging device including a temperature sensor, and said microprocessor being adapted to control the generation of said feedback control signals by said synthesizer based at least partially upon temperature sensed by said sensor, and

said microprocessor being adapted to determine age of said transmission/reception device whose synthesizer is controlled by said microprocessor and to control the generation of said feedback control signals based at least partially upon said age.

Generate Collection

L7: Entry 3 of 3 File: USPT Mar 24, 1998

DOCUMENT-IDENTIFIER: US 5732074 A
TITLE: Mobile portable wireless communication system

Abstract Text (1):
Communication of information including data between a remote computer and a vehicle is managed and facilitated using an apparatus compatible with standardized network communication links. In one embodiment, the standardized network communication links include the Internet and a controller area network used in vehicles. The apparatus preferably includes a controller contained in the vehicle. The controller is comprised of a number of hardware and software elements including a processor. A TCP/IP stack is part of the controller for providing the necessary control in checking for communicating information, such as requests and data, over the Internet. A web server communicates with the TCP/IP stack for servicing information related requests in http format including obtaining or sending information in operative communication with the TCP/IP stack. A CGI-bin (common gateway interface-binary) communicates with the web server and acts as a link to executable software stored in program memory that is responsive to user requests. A data memory is also available for storing data in html that is accessible by the web server. A real time operating system (RTOS) is involved in task and memory management as part of the responding to requests for information. The controller is able to receive requests using a wireless device when it is in the vehicle and through a communications port when the wireless device is not in the vehicle. In another embodiment, each of the plurality of vehicle devices has an Internet address or designation associated with it.

Application Filing Date (1):
19960116

Brief Summary Text (7):
In accordance with the present invention, a system is provided in which communication of information, including requests, commands and data, is achieved between vehicle having physical vehicle devices and one or more sites that are remote from the vehicle. The information communication is implemented using certain standardized network communication links that enable multiple users, either simultaneously or at separate times, with different communications and processing hardware, software and different applications and requiring information from different vehicle devices, to obtain the desired information while avoiding design complexities in interfacing the remote site with the vehicle devices.

Brief Summary Text (8):
The system includes, at the remote site, a computer terminal which can be a conventional PC with a modem. The computer terminal is able to communicate with a first standard communications network link, such as the Internet, through its modem. An internet or a world wide web browser, for example, that is available to the computer terminal is accessed. The computer terminal supplies the browser with an IP (Internet protocol) address. This IP address is associated with a particular vehicle including communications related hardware contained in the vehicle. Typically, the IP address is accompanied by a request or command for information or data that is available from the particular vehicle. In addition to this first standardized communications network, since bi-directional communications involving

a vehicle are conducted wirelessly for at least a portion of the communications link, it is necessary for the Internet to communicate with an appropriate interface or network that wirelessly links with the vehicle. In one embodiment, the cellular digitized packet data (CDPD) network provides the desired link including arrangement of information being communicated and where the destination site, namely the particular vehicle, is found in the network. If a channel is available to the particular vehicle, the CDPD link can proceed to transmit the Internet packets to the vehicle of interest. Instead of the CDPD network as the link, a communications interface could be employed that involves data only, such as a two way paging interface with the vehicle.

Brief Summary Text (9):
With respect to handling requests, commands and information including data transfers relative to the vehicle, particularly involving data from vehicle devices, certain hardware and software is contained in the vehicle. For receiving information from the Internet, a wireless device, such as a cellular phone, having the appropriate hardware and channels acts as a receiver for such information in combination with an appropriate airlink modem, such as a CDPD network modem. The wireless device is contained within the vehicle and communicates with a controller through a phone interface. The phone interface provides the necessary electrical signal connections between the output lines or channels from the wireless device and the controller inputs.

Brief Summary Text (10):
The controller is also found in the vehicle and is a key unit of the apparatus and includes a number of hardware and software elements. Specifically, a TCP/IP (transmission control protocol/Internet protocol) stack acts on a received request or command by performing a number of functions. The received request has a IP address associated with it and a check is made as to whether or not the request has the correct address. Further, the formatted data is checked for accuracy. The TCP is responsible for controlling the structure and flow of the received information. In that regard, the TCP/IP stack is associated with a number of sockets that it communicates with or links to, with the selected socket being dependent upon the content of the received information. In that regard, among the sockets available to the TCP/IP stack is a server. In conjunction with effectively communicating over the Internet, an http (hypertext transmission protocol) web server is utilized. The web server operates in accordance with world wide web protocol and services information related requests in http format including obtaining or getting information based on a received request or command and sending or posting information in response to received requests or commands. The controller also includes data memory for storing data in html (hypertext markup language) format, with such data being frequently previously collected from vehicle devices and stored in the data memory. In response to a request, for example, the web server accesses the data memory to obtain desired data and encapsulates it in accordance with http format for transmission from the controller through the wireless device using an appropriate airlink modem to a destination site (remote station).

Brief Summary Text (13):
More specifically, with respect to transmission of information from the controller through the wireless device to a remote site, after receipt of a request as previously described and in accordance with one procedure, the web server interprets the transmitted request and determines that certain data stored in the data memory is being requested by a user at the remote site. The stored data is accessed and prepared by the web server in accordance with http format for transmission over the Internet. The http formatted information is subject to the operation of the TCP/IP stack for regulating the transmission of the requested information including associating a destination IP address with the information being sent. Once the information is properly prepared using the TCP/IP stack, it can be sent over the airlink via the wireless device to the Internet connection using appropriate airlink modems.

Brief Summary Text (14):
In a variation of this operation, instead of a request starting from the remote station, the sending of information including data might be initiated in the vehicle. By way of example, it may be necessary or desirable that certain data parameters be periodically transmitted to a remote station for analysis or other considerations. In still another operation variation, an additional information transmission can be received from another user located at a different remote site during the time that a first request for information is being processed by the controller. In such a case, the TCP/IP stack, in conjunction with the operating system, enables multiple tasks to be performed in a controlled manner so that more than one user is able to communicate with the controller at the same time.

Brief Summary Text (15):
Preferably, the controller in the vehicle is also associated with an interface for communication with one or more available systems, such as an RS232 connection, an Ethernet connection and/or a PCMCIA unit. In a related embodiment, the controller includes a direct communications port for receiving and sending information without requiring the wireless device and the Internet connection to the wireless device. In this embodiment, the direct communications port receives information or data using another source contained in the vehicle, such as the vehicle's radio. Subcarrier information is transmitted to the radio and decoded for input to the direct communications port for subsequent analysis or use by the CAN. In yet a further variation of controller operation, each vehicle device on the CAN has its own IP designation or address so that the remote user can utilize this designation or address for communication with the selected vehicle device having that designation or address. The controller uses the received IP address or designation for the particular device and acts as a link or bridge for the remote user to the particular device.

Brief Summary Text (16):
Based on the foregoing summary, a number of salient features of the present invention can be readily identified including the substantial elimination or avoidance of numerous, different and complex hardware and software for communicating information involving physical devices located in a vehicle and one or more computers located at one or more remote sites. A combination of controller related components are containable in a vehicle for responding to requests from remote sites, obtaining and storing information associated with vehicle devices and running executable software that may be available in the program memory of the controller or downloaded from the remote site, while handling and configuring information including data that is communicative with the remote site over an established network, such as the Internet. Furthermore, the controller efficiently communicates with another standard network found in a vehicle, such as the controller area network, to obtain data from the vehicle devices and, when appropriate, send messages or information to the vehicle devices. The controller elements are important in communicatively linking together previously incompatible remote and vehicle networks to achieve a functional mobile communication system. The overall system including the standardized networks effectively enables, either substantially simultaneously or separately, a variety of applications to be performed by multiple users and which applications utilize one or more of a large number of selectable and different vehicle devices, while not requiring substantial allocated memory in the vehicle.

Detailed Description Text (2):
With reference to FIG. 1, an apparatus is illustrated in the block diagram for hi-directional communication between one or more remote stations 10a-10n and a vehicle. The bi-directional communication has the capability of involving multiple users and a number and variety of applications that are germane to the vehicle. Each remote station can include communications and processing related hardware and software that is different from that of the other remote stations. To avoid

extensive and customized hardware and software in order to achieve the desired bi-directional communications, a standardized remote network communications link 14 is utilized. That is, each user who wishes to communicate with the vehicle, need not develop and establish the necessary interfacing networks and protocols for communication with the vehicle. Each user, including users who operate independently of other users, is able to access the vehicle through the same standardized remote network communications link 14, regardless of the particular application or applications that the user has for implementation or operation in conjunction with hardware and software associated with the vehicle. In a preferred embodiment, the remote network communications link 14 is the Internet. With respect to communication with a vehicle, the information being communicated must be configured or formatted in a way that achieves proper communication over an airlink to the vehicle. This is accomplished using a suitable switching station identified generally as a remote airlink transfer protocol modem 16. In one embodiment, the communication information is formatted in accordance with a CDPD (cellular digitized packet data) configuration. At the vehicle, this information is received by a wireless device 18 that is able to transmit and receive information via the airlink. The wireless device 18 is operatively associated with a vehicle airlink transfer protocol modem 20 for the proper handling of the airlink formatted transmission. In one embodiment, the wireless device 18 includes a cellular phone that is selected from a plurality of conventional or commercially available cellular phones. The wireless device 18 bi-directionally communicates with a controller 30 contained in the vehicle through a network protocol converter 26 using a wireless device interface 22. The wireless device interface 22 establishes the necessary signal compatibilities and connections from the wireless device 18. The network protocol converter 26 removes or otherwise converts the inputted information to a form that is acceptable to the controller 30 or, alternatively, information is made compatible with the remote airlink transfer protocol modem 16 when such information is sent through the airlink using the network protocol converter 26. In conjunction with the FIG. 1 illustration, the network protocol converter 26 is essentially part of the wireless device 18 and physically separated from the controller 30 but electrically connected thereto so that no network protocol converter is required in the controller 30. In the embodiment to be described in greater detail herein, the network protocol converter 26 includes a TCP/IP stack which can be part of the controller 30 so that the controller 30 is also definable or can be referred to as a controller/network protocol converter 30. The controller 30 is responsible for a number of functions related to understanding and acting on information received from one or more remote stations 10, obtaining and responding to requested information and operatively functioning with information including data available from other elements in the vehicle. In that regard, the controller 30 communicates with a controller interface 34 that electrically links the controller 30 with a vehicle standardized network 40. The vehicle standardized network 40 includes a controller unit 44 that provides appropriate message and data handling functions associated with sending and receiving information including data from each of a plurality of physical vehicle devices 50 that are operatively connected to a bus 46 of the vehicle standardized network 40. Like the remote standardized network 14, the vehicle standardized network 40 is an established and previously developed network that interfaces with components in a vehicle, such as engine related components in order to provide desired or requested data concerning the operations or status of these components. An important aspect of the apparatus of the present invention involves the enabling of communications between two mutually incompatible and highly dissimilar standardized networks. More specifically, full communication capabilities are achieved among numerous remote stations via a global or remote standardized network and vehicle devices via a localized standardized network, either at different or at the same times, using the apparatus even though the global and localized networks are configured substantially differently and involve significant protocol and environmental differences. That is, the remote standardized network 14, such as the Internet, is configured as an information communications system having no geographic boundaries. The vehicle or localized standardized network 40 is designed

to function properly in the electrically noisy and otherwise hostile vehicle environment. The diverse design objectives and problems faced by these two different standardized networks therefore requires a communications related apparatus that is able to effectively enable these two networks to bi-directionally communicate with each other, as well as other hardware and software that is operably connected to the two standardized networks. In accordance with the present invention, the vehicle devices 50 might include a large number of diverse devices, including common vehicle parts or components, for providing and receiving information including data, as well as, in some cases, acting on such information by analyzing or processing such information. With regard to providing information to a remote station 10, a substantially symmetrical relationship exists among the elements of FIG. 1. That is, the controller 30 is able to prepare information for sending to a remote station 10, including data or other information available from one or more of the vehicle devices 50 using the vehicle standardized network 40. Such information is sent to the wireless device 18 through its interface 22 for transmission using the vehicle airlink transfer protocol modem 20 over the airlink to the remote station 10 by way of the remote standardized network 14 in combination with the remote airlink transfer protocol modem 16.

Detailed Description Text (5):
The controller 30 also includes a TCP/IP (transmission control protocol/internet protocol) stack 98 for providing necessary communication protocols in association with the Internet. The TCP regulates the flow and structure of data or other information including an operative communication with a web server 102. The IP is responsible for recognizing source and destination addresses in connection with insuring receipt at the proper location, as well as checking for the accuracy of data packets received from the airlink. The TCP/IP stack 98 is invoked initially when information is received by the controller 30 and is invoked when information including data is to be outputted from the controller 30 to the phone interface 84. Preferably, the TCP/IP stack 98 is a commercially available portable unit for an embedded system that provides a single threaded stack for supporting multiple sockets including sockets associated with the web server 102. The web server 102 services information related requests in http (hyper text transmission protocol) format. These requests include obtaining or getting information, as requested, and the sending or posting of information, as requested. The web server 102 is also a commercially available Internet related product. With respect to getting information, the controller 30 further includes a data storage unit or data memory 106. Generally, the data memory 106 stores data that has been generated and is expected to be useful in handling requests or commands. Such data may be data obtained from monitoring a physical device associated with a vehicle and/or may include data useful in running executable software that is intended to provide further information or data useful to a requestor. The data in the data memory 106 is preferably configured in html (hyper text markup language). In this configuration, the web server 102 is able to access the data memory 106 and obtain such configured data for encapsulation or incorporation in the http format for communication over the Internet 68. In addition to communication with the data memory 106, the web server 102 is operatively linked to a CGI-bin (common gateway interface-binary) 110. The CGI-bin 110 acts as a link or a gate to a number of typically short executable programs stored in program memory 114. Such stored executable software may encompass a variety of applications associated with the vehicle. Generally, such software is useful in processing, analyzing or otherwise acting on data available in the vehicle, including acting on the data in real time, such as acting on available data in real time that is used for transmission to a remote station, where such transmission is initiated in the vehicle. A representative listing of applications is as follows:

Detailed Description Text (20):
As also illustrated in FIG. 2, information can be communicated to the apparatus without passing through the cellular phone 80. A direct communications port 144 is operatively associated with the device driver assembly 128 for communication

through the CAN 124 to one or more of the vehicle devices 50a-50n. The direct communications port 144 has particular utility when the cellular phone 80 or other wireless device is not in the vehicle. In that situation, information is communicated using another device or unit in the vehicle. For example, the vehicle radio receives a transmission having a subcarrier signal that conveys information useful to and understood by the hardware associated with the direct communications port 144. The data stream that is inputted to the port 144 was previously obtained or decoded to provide the information in a format compatible with the port 144. Conversely, the port 144 enables information carrying signals to be outputted therefrom for transmission outside of the vehicle, such as again using the vehicle's radio.

Detailed Description Text (22):
The description so far has been directed to an embodiment in which the vehicle or the controller 30 is associated with an address that the Internet 68 utilizes in connection with sending information to the vehicle. In another embodiment, each of the vehicle devices 50a-50n has its own IP (internet protocol) address or designation. A user at a remote station 10 that wishes to send or receive information relative to a particular vehicle device 50a-50n, utilizes the IP address or designation of the vehicle device in order to achieve the information transfer relative to the particular vehicle device 50. In this case, the controller 30 and its operation are essentially transparent to a user at a remote site and each vehicle device 50 appears or acts as if it is a TCP/IP device. An example of operation, in accordance with this embodiment, might involve a vehicle device 50, such as a CD-ROM unit. Specifically, the user or accessor of the CD-ROM unit provides an IP address for this device and it is received by the vehicle having the CD-ROM unit. The controller 30 recognizes this IP address and is able to provide the requested link to the CD-ROM unit through the CAN 124. As a possible variation or addition to such an operation, the controller 30 can include an applet that is associated with this IP address. When this IP address for the CD-ROM unit is recognized by the controller 30, the controller 30 sends the applet to the user accessing the Internet 68, where the applet is received by the browser 72. The browser 72 uses the applet to bring up a display using the computer terminal 60. The display might include, for example, buttons that represent CD-ROM unit controls that the user can "click on" to cause certain operations associated with the CD-ROM unit.

Detailed Description Text (23):
In further related methods of operation when an http request is received by the web server 102, the controller 30 is able to respond in a dynamic manner to reflect the current status or conditions of vehicle devices 50. By way of example, as just noted, when all vehicle devices are properly functioning and providing data, an html page including one or applets could be downloaded to handle such data from the controller 30. However, if one or more vehicle devices are not producing accurate data, a determination might be made to modify the content or number of applets that are usually downloaded in connection with such data when it is accurate. This reduces the magnitude and time of transmission, which results in a decrease in the cost of the wireless transmission, especially where there is a substantial amount of data, a large number of vehicles and/or an expected transmission on a very regular basis. As an additional example, the controller 30 might utilize information including data from a group of vehicle devices that is to be served to an applet embedded in a page. In a case in which one or more vehicle devices are not properly functioning or not functioning at all, the quality of information produced by the embedded application varies and is not reliable. Thus, it would be useful to be able to alter the presentation of this information in a dynamic manner. That is, such a presentation should reflect accurate data and the controller 30 is able to make a determination as to what information or data should be presented when such situations arise.

Detailed Description Text (25):

With reference to FIG. 3, the operation of the present invention is further described in the context of a flow diagram illustrating steps for transmitting and receiving information between a computer terminal 60 and a vehicle of interest. In particular, the user inputs a message at the computer terminal 60, in accordance with block 200. The message includes at least an IP address and a request for information that is obtainable from the subject vehicle. The message is transmitted via the modem 64 connected to the computer terminal 60 utilizing the browser 72 at block 204 to direct or route the host message in accordance with the IP address. At block 208 the Internet 68 is accessed for carrying the message. As part of the message transmission, the remote CDPD network modem 76 is employed at block 212 to packetize the data message so that it can be properly transmitted over the airlink. At block 216, the CDPD transmitted message is received by the cellular phone 80 or other transceiver and the output thereof is gated to the controller 30 having the TCP/IP stack 98 at block 220 after the message is demodulated by the vehicle CDPD network modem 82. The IP checks the accuracy of the identified address and other information in the message. The TCP coordinates the flow of the message and prepares it for transmission to the http web server 102 at block 224. The web server 102 under the control and process functioning of the RTOS 94/processor 90, services the information related request in http format. In accordance with one example, the message includes a request for vehicle information related to engine and/or other vehicle component operations or conditions. In one application, for example, the requested vehicle conditions might have to be obtained from data that is processed or analyzed using executable software or a program stored in the program memory 114. In such a case, a request based on the message is applied to the CGI-bin 110 at block 228. This link enables the desired program to be selected and run under the processing/control of the processor 90/RTOS 94. As part of that execution, it may be necessary to obtain previously stored information including data from the data memory 106 Additionally, or alternatively, it may be necessary to obtain current or other data that is available from a particular vehicle device itself. In that context, the processor 90/RTOS 94 obtains such information through the CAN controller unit 122 via the CAN bus 126 at block 232. The CAN protocol is utilized to request and obtain the data from the selected vehicle device at block 236. The data obtained by the CAN 124 is utilized by the processor 90 in connection with the execution of the selected program that is being executed. In one embodiment, with the requested data related to the vehicle component conditions having been obtained by processing, or from one or more vehicle devices 50, or by both methods, such data can then be included in page information. Portions of the page information could be stored in the data memory 106, with the obtained data being included in the appropriate parts of the page. Once this is completed, the page information is handled by the web server 102 for sending the page information in http format. The TCP/IP stack 98 is involved in the control of the transmission of this page information, as well as checking the destination address. The page information is transmitted through the cellular phone 80 including being packeted for a CDPD network transmission, using the vehicle CDPD network modem 82 for transmission over the Internet 68 to the requesting computer terminal 60. The page information can then be displayed on the display unit of the computer terminal 60.

Detailed Description Text (26):
With regard to operation variations, with respect to one or more alarm conditions, when a particular vehicle device 50 detects or is involved with an alarm event, this is reported by the CAN 124 to the processor 90 using the device drivers 128. The processor 90 and the TCP/IP stack 98 cooperate to send a signal through the cellular phone 80 indicative of this alarm condition, without the need to utilize the web server 102. The signal representative of the alarm condition is properly directed to a predetermined IP address over the Internet 68. Relatedly, the processor 90 is able to execute an appropriate interrupt routine in order to delay or interrupt a response that is being performed due to a currently existing request to the controller 30 in order to process the detected alarm condition. After such processing, the processor 90 can continue with responding to the request that was present prior to the interrupt. Additionally, the controller 30 is able to be

responsive to more than one request from different users at different remote stations. The processor 90 and the RTOS 94 cooperate to perform multiple tasks in a coordinated fashion in response to requests from multiple users.

Detailed Description Text (27):
Previous discussions of the operation of the apparatus have primarily been directed to operations in which the sending of information is initiated by a remote computer terminal 60. With reference to the flow diagram of FIG. 4, a further related description of the operation of the present invention involves a case in which information is transmitted upon initiation of the controller 30 in the vehicle. In accordance with such an operation, data or other information from one or more vehicle devices 50a-50n is provided over the airlink to one or more remote stations 10a-10n on a predetermined or determinable time basis. For example, each vehicle in a fleet of vehicles might be required to report its location on a periodic basis to a remote station 10. The steps of FIG. 4 are next described in the context of such an example. At block 300, vehicle positioning data is available from one of the vehicle devices 50, which might be a GPS. On a requested or regular input scheme, such vehicle device data is sent to the CAN bus 126 at block 304. The CAN controller 122 is responsible for controlling the receipt and transmitting of such data to the controller 30 at block 308. The vehicle data that is to be transmitted over the wire link, in accordance with the predetermined or determinable procedure, is appropriately processed, analyzed or otherwise acted on using the controller 30 at block 312. In one embodiment, vehicle device data, such as GPS data, do not rely on the web server 102 but may utilize a different communications pathway, such as E-mail. In any event, the controller 30 gates the vehicle location data to the cellular phone having the vehicle airlink transfer protocol modem 20, such as a CDPD network modem 82, at block 316. The vehicle location data is properly formatted and transmitted through the cellular phone over the airlink at block 320. In receiving such data from the airlink, a remote airlink transfer protocol modem 16, such as a remote CDPD network modem 76, collects such data at block 324 and subsequently passes the vehicle data to the Internet 68 at block 330. The desired computer terminal 60 receives the vehicle positioning data from the Internet 68 at block 334. In accordance with desired embodiments, such data can be further processed by the computer terminal 60, displayed on a display unit thereof in a pre-established way, or otherwise handled to achieved desired use of the received data. In a related variation of this embodiment, after processing such data, the computer terminal 60 may initiate further actions in the way of sending information to the vehicle for adjusting or otherwise affecting the vehicle device that provided the data for analysis. That is, based on the data received and analyzed by the computer terminal 60, a determination is made that a desired or feedback input needs to be provided in real time to this vehicle device.

CLAIMS:

1. An apparatus for information transmission involving one or more remote stations and a vehicle, comprising:

at least a first remote station including computer means located at a distance from a vehicle;

a wireless device for location in the vehicle for use in sending and receiving information including data relative to said first remote station over an airlink;

a plurality of different vehicle devices associated with the vehicle and with each of said vehicle devices for at least one of receiving and sending said information;

controller means including processing means in the vehicle for controlling the sending and receiving of said information using said wireless device between said first remote station and the vehicle, said controller means further including first

standard network communication means for use in presenting information for transmission over the airlink in a first format that is acceptable to a first standardized network that includes the airlink, wherein said first network communication means enables said information to be provided to multiple users that utilize different makes of communication equipment, different processing hardware and different applications software executable by said processing means of said controller means, said first standard network communication means including a web server in the vehicle for responding to a plurality of service related requests and providing said information in said first format for transmission to said computer means at said first remote station using said wireless device; and

a second standard network communication means, different from said first standard network communication means, in communication with said controller means for presenting information in a second format that is acceptable to a second standardized network, with said second standardized network communication means communicating with said vehicle devices for sending and receiving said information relative thereto and in which said controller means enables said information to be properly communicated between said first and second standardized networks.

2. An apparatus, as claimed in claim 1, wherein:

said first standard network communication means includes first means for communicating with said wireless device for receiving a request for said information obtainable from at least one of said vehicle devices, said first means including means for checking source address information associated with said request in determining that said request is to be responded to by said controller means.

3. An apparatus for information transmission involving one or more remote stations in a vehicle, comprising:

at least a first remote station including computer means located at a distance from a vehicle:

a wireless device for location in the vehicle for use in sending and receiving information including data relative to said first remote station over an airlink;

a plurality of different vehicle devices associated with the vehicle and with each of said vehicle devices for at least one of receiving and sending said information;

controller means including processing means in the vehicle for controlling the sending and receiving of said information using said wireless device between said first remote station and the vehicle, said controller means further including first standard network communication means for use in presenting said information for transmission over the airlink in a first format that is acceptable to a first standardized network that includes the airlink, wherein said first network communication means enables said information to be provided to multiple users that utilize different makes of communication equipment, different processing hardware and different applications software executable by said processing means of said controller means, said first standard network communication means including a web server in the vehicle for responding to a plurality of service related requests and also including transmission control protocol means in communication with said web server for regulating flow and ordering of said information related to said vehicle devices to said web server; and

a second standard network communication means, different from said first standard network communication means, in communication with said controller means for presenting information in a second format that is acceptable to a second standardized network, with said second standardized network communication means

communicating with said vehicle devices for sending and receiving said information relative thereto and in which said controller means enables said information to be properly communicated between said first and second standardized networks.

4. An apparatus for information transmission involving one or more remote stations in a vehicle, comprising:

at least a first remote station including computer means located at a distance from a vehicle;

a wireless device for location in the vehicle for use in sending and receiving said information including data relative to said first remote station over an airlink;

a plurality of different vehicle devices associated with the vehicle and with each of said vehicle devices for at least one of receiving and sending said information;

controller means including processing means in the vehicle for controlling the sending and receiving of said information using said wireless device between said first remote station and the vehicle, said controller means further including first standard network communication means for use in presenting said information for transmission over the airlink in a first format that is acceptable to a first standardized network that includes the airlink, wherein said first network communication means enables said information to be provided to multiple users that utilize different makes of communication equipment, different processing hardware and different applications software executable by said processing means of said controller means, said first standard network communication means including a web server in the vehicle for responding to a plurality of service related requests and also including a CGI-bin communicating with said web server and in which said CGI-bin links said web server with a number of executable programs useful in obtaining said information related to said vehicle devices; and

a second standard network communication means, different from said first standard network communication means, in communication with said controller means for presenting information in a second format that is acceptable to a second standardized network, with said second standardized network communication means communicating with said vehicle devices for sending and receiving said information relative thereto and in which said controller means enables said information to be properly communicated between said first and second standardized networks.

5. An apparatus for information transmission involving one or more remote stations in a vehicle, comprising:

at least a first remote station including computer means located at a distance from a vehicle;

a wireless device for location in the vehicle for use in sending and receiving information including data relative to said first remote station over an airlink;

a plurality of different vehicle devices associated with the vehicle and with each of said vehicle devices for at least one of receiving and sending said information;

controller means including processing means in the vehicle for controlling the sending and receiving of said information using said wireless device between said remote station and the vehicle, said controller means further including first standard network communication means for use in presenting said information for transmission over the airlink in a first format that is acceptable to a first standardized network that includes the airlink, wherein said first network communication means enables said information to be provided to multiple users that

utilize different makes of communication equipment, different processing hardware and different applications software executable by said processing means of said controller means, said first standard network communication means including a web server in the vehicle for responding to a plurality of service related requests received using said wireless device, with said web server in communication with program memory for storing said executable software in connection with obtaining said information from said vehicle devices and in which said first standard network communication means further includes an operating system for managing a number of services associated with conducting applications oriented tasks in conjunction with said executable software; and

a second standard network communication means, different from said first standard network communication means in communication with said controller means for presenting information in any second format that is acceptable to a second standardized network, with said second standardized network communication means communicating with said vehicle devices for sending and receiving said information relative thereto and in which said controller means enables said information to be properly communicated between said first and second standardized networks.

7. An apparatus for information transmission involving one or more remote stations in a vehicle, comprising:

at least a first remote station including computer means located at a distance from a vehicle

a wireless device for location in the vehicle for use in sending and receiving information including data relative to said first remote station over an airlink:

a plurality of different vehicle devices associated with the vehicle and which each of said vehicle devices for at least one of receiving and sending said information;

controller means including processing means in the vehicle for controlling the sending and receiving of said information using said wireless device between said first remote station and the vehicle, said controller means further including first standard network communication means for use in presenting said information for transmission over the airlink in a first format that is acceptable to a first standardized network that includes the airlink, wherein said first network communication means enables said information to be provided to multiple users that utilize different makes of communication equipment, different processing hardware and different applications software executable by said processing means of said controller means, said first standard network communication means including a web server in the vehicle that responds to a plurality of service related requests and provides said information in said first format and a data memory that communicates with said web server for storing data in html that is obtainable using said web server and in which said web server provides said data in said first format, with said first format being http; and

a second standard network communication means, different from said first standard network communication means, in communication with said controller means for presenting said information in a second format that is acceptable to a second standardized network, with said second standardized network communication means communicating with said vehicle devices for sending and receiving said information relative thereto and in which said controller means enables said information to be properly communicated between said first and second standardized networks.

8. An apparatus as claimed in claim 1, wherein:

said controller means includes a communications port for receiving communications port information separately from said wireless device, with said communications

port information being useful in providing an input to one of said plurality of vehicle devices through said second standard network communication means.

12. A method for using at least a first standardized network for communicating information between a remote station and a vehicle, comprising:

providing a wireless device in the vehicle;

sending a message including a request for information and an address using a computer at the remote station;

formatting said message so that it is acceptable to the first standardized network;

configuring said message to communicate said message over an airlink;

receiving said message in the vehicle using said wireless device;

coordinating said request for information including checking for an address;

sending said request for information to a server;

obtaining information based on management by said server of said request for information, said obtained information being provided in accordance with a predetermined language arrangement, said obtaining step including accessing data memory for storing data defined in html using said server;

formatting said obtained information using said server;

transmitting said obtained information over said airlink using said wireless device; and receiving said information by said computer.

15. A method, as claimed in claim 13, wherein:

said obtaining step includes receiving said request for information separately from said wireless device using a communications port associated with controller means that communicates with said wireless device when said wireless device is not in the vehicle.

16. A method for using at least a first standardized network for communicating information between a remote station and a vehicle, comprising:

providing a wireless device in the vehicle;

sending a message including a request for information and an address using a computer at the remote station;

formatting said message so that it is acceptable to the first standardized network:

configuring said message to communicate said message over an airlink;

receiving said message in the vehicle using said wireless device;

coordinating said request for information including checking for an address;

sending said request for information to a server;

obtaining information based on management by said server of said request for information; said obtained information being provided in accordance with a

predetermined language format, said obtaining step includes invoking an applications program using a CGI-bin in communication with said server and subsequently executing said applications program using processing means in the vehicle;

formatting said obtained information using said server;

transmitting said obtained information over said airlink using said wireless device; and

receiving said information by said computer.

21. A method for communicating information between a computer at a remote site and a vehicle having a plurality of vehicle devices for sending and receiving information including data, comprising:

providing a wireless device in the vehicle;

requesting data from a first of said vehicle devices using said computer;

formatting said request so that it is acceptable to a first standardized network, with said request including a first address associated with said first vehicle device, said step of formatting said request includes using a http web server and said first standardized network includes the Internet;

configuring said request to communicate said request over an airlink;

receiving said request in the vehicle using said wireless device;

managing said request including where said data is to be obtained with reliance on said first address of said first vehicle device;

obtaining said data after said managing step using a second standardized network, different from said first standardized network, said second standardized network includes a controller area network for providing communications protocol for a number of different vehicle devices;

formatting said data so that it is acceptable to said first standardized network;

transmitting said data over said airlink using said wireless device; and

receiving said data associated with said first vehicle device by said computer.

First Hit Fwd Refs

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L15: Entry 1 of 5 File: USPT Apr 25, 2000

DOCUMENT-IDENTIFIER: US 6054920 A
TITLE: Alarm system receiver supervisor

Application Filing Date (1):
19961015

Brief Summary Text (2):
The present invention generally relates to security alarm systems which include a plurality of distributed alarm sensors, and which communicate with a system controller at a protected premises. The system controller may communicate with an off-site central station.

Brief Summary Text (3):
The invention particularly relates to a wireless receiver module that is coupled to the system controller and which includes an ability to monitor the operational integrity of the wireless receiver circuitry and distinguish the malfunction of the receiver circuitry.

Brief Summary Text (7):
It is therefore desirable that either the system controller or an intervening wireless receiver module have an ability to monitor or supervise the operational integrity of the wireless receiver circuitry. The processor at the system controller can thereby be made aware of any defective wireless sensors as well as the operational integrity of the receiver circuitry.

Brief Summary Text (17):
Various of the foregoing objects, advantages and distinctions of the invention are disclosed in a presently preferred alarm system which includes a number of sensors that are distributed about a monitored premises. Hardwired sensors are hardwired to a system controller at the site. Wireless sensors communicate with a wireless receiver module that is separately coupled to the system controller. The system controller, in turn, communicates with a central station via one or more telephone lines.

Drawing Description Text (2):
FIG. 1 shows a block diagram to a typical alarm network having a number of system controllers and one of which is coupled to a receiver module which monitors wireless sensor transmissions and the operational integrity of the RF receiver circuitry at the module;

Detailed Description Text (16):
The determination of whether bit 2 of D9 needs to be set is made by the microprocessor 34. A receiver supervisory timer is maintained, separate from a number of sensor supervisory timers, and reset each time any RF sensor transmission is received by the microprocessor 34. Although shown as discrete timers, the sensor and receiver supervisory timers are maintained in the microprocessor 34. If no RF sensor transmissions are received within the receiver supervisory time period, bit 2 is set and transmitted to the system controller 10. With the next status transmission to the central station 4, the receiver failed status is transmitted to the central station 4 for analysis. The receiver failure information might induce

central station personnel to transmit a message to another location, such as an off site guard service to check the system and receiver module 9, or possibly to converse with personnel at the site via the audio controller 8, if present in the system.

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Generate Collection

L15: Entry 4 of 5 File: USPT May 25, 1999

DOCUMENT-IDENTIFIER: US 5907807 A
TITLE: Dynamic learning of neighboring wireless cells

Application Filing Date (1):
19961218

Brief Summary Text (4):
In prior art wireless communication systems, the implementation for performing an activity transfer such as a handoff was as follows. When the cell-site receiver handling a call from a wireless telephone noticed that the received signal strength from the wireless telephone fell below a predetermined threshold value, the cell site asked a system controller controlling the overall wireless system to determine if a neighboring cell site was receiving the wireless telephone's signal at an adequate signal strength. The system controller in response to the current cell site inquiry sent messages to the neighboring cell sites with a handoff request. Each neighboring cell site scanned for the signal from the wireless telephone on the channel specified by the system controller. When one of the neighboring cell sites reported an adequate signal level to the system controller, the system controller implemented the handoff. This method of determining neighboring cell-sites performs well for conventional cellular systems in which the number of cell sites is reasonably small, and each cell site covers a large geographical region. Because each cell site covers a large geographical region, the number of handoffs that occur is reasonably low.

Brief Summary Text (5):
Whereas this technique of performing handoff has worked well for large cellular telephone systems, in large personal communication systems (PCS), the technique has not been as effective in all situations. The reason is that within a large PCS system, there are potentially hundreds of cell sites each having an extremely small geographical area. In addition, PCS system uses high transmission frequencies and low transmission power resulting in frequent handoffs. Another problem in certain large PCS systems is that they are in office buildings where there are many obstructions, also the physical destination of the wireless handset's user plays a important role in the handoff process. For example, if the handset is moving down a particular hallway in a given direction, then the handoff should be to the next cell site that can handle that hallway in that direction. Note, because of the power and transmission frequencies or obstructions this desired cell site may not be the closest geographical cell site to the hallway. Because of the need to do frequent handoffs for each individual active wireless telephone and the extremely large number of cell sites, the system controller experiences a large real time processing load from performing handoffs. In addition, the PCS system is distinguished from a cellular telephone system in that a cellular telephone system may have each cell site surrounded by only three other cell sites; whereas, the PCS system normally will have each cell site having seven to 32 possible neighbors that may be candidates for a handoff. Further, because of the large number of cell sites in a PCS system, it is very difficult for a system administrator to hand specify for each cell site what are the possible candidate cell sites for handoffs let alone determine the best candidate cell sites based on user traffic patterns. In addition, PCS systems are characterized by constant addition and removal of cell sites.

Brief Summary Text (6):
It is clear that a problem exists with the present method for doing handoffs in large PCS systems since requiring each of the neighboring cell sites to monitor the wireless handset and report back to the system controller places a large real time processing burden on the system controller.

Brief Summary Text (8):
The foregoing problem is solved, and a technical advance is achieved by an apparatus and method in which a system controller uses dynamic learning techniques to determine a subset of neighboring cell sites to which an activity transfer should be attempted. Advantageously, an activity transfer can be a handoff or registration. This dynamic learning for each cell site can be done for all users or may be customized for each individual user. Advantageously, the neighboring cell sites that should be chosen for an activity transfer are specified for each cell site. The specified neighboring cell sites are determined by the dynamic learning process. In a first embodiment, the dynamic learning is accomplished by accumulating statistical data that defines the average call duration of each of the selected neighboring sites after an activity transfer to each. Advantageously, this average duration can include the total call duration for two subsequent activity transfers. In addition to choosing from the subset of known neighboring cell sites, the system controller randomly chooses a small subset of the remaining cell sites in the system as potential activity transfer target cell sites in order to learn new neighboring cell sites.

Detailed Description Text (3):
To understand the operation of the wireless communication system of FIG. 1, in accordance with a first embodiment of the invention, consider the following example. This example uses a handoff as the activity transfer being performed. Cell 101 has overlapping areas with cells 102-109. However, due to the traffic flow within the building which is serviced by the wireless communication system, users of wireless handsets do not in general leave cell 101 and enter cells 106-109. The normal traffic pattern is to leave cell 101 and enter cells 102-104. Cell 101 is currently active on a call with wireless handset 117. In the prior art, when the base station of cell 101 recognized that wireless handset 117 was leaving cell 101 due to a change in transmission signal strength, the base station informs system controller 118 of this fact. The base station of cell 101 realizes that wireless handset 117 is leaving its cell area as the signal strength of the transmission from wireless handset 117 goes below an acceptable level. System controller 118 then looks in a table associated with cell 101 to determine target cells. In the present example, the target cells are cells 102 through 109. System controller 118 requests that the base station in each of the target cells monitor transmission signal from wireless handset 117 for an adequate transmission signal. Each base station then must report back to system controller 118. Although, the wireless telecommunication system of FIG. 1 is illustrated as having a fairly small number of cells, in general, such a wireless telecommunication system has hundreds of cells. There are a large number of cells reporting back whether or not they were receiving the signal from a wireless handset in the process of doing a handoff at any given time. Hence, handoffs place a large real time processing load on system controller 118.

WEST Search History

Hide Items | Restore | Clear | Cancel

DATE: Monday, February 02, 2004

Hide?	Set Name	Query	Hit Count
		DB=PGPB,USPT,USOC,EPAB,JPAB,DWPI,TDBD; PLUR=YES; OP=ADJ	
☐	L15	L13 and l1	5
☐	L14	L13 and l2	1
☐	L13	19990318	107
☐	L12	controller near8 (monitor or monitoring) near8 wireless	313
☐	L11	19990318	1
☐	L10	controller near8 transceiver near8 (network near4 (interface or card)) near8 (processor or microcontroller)	83
☐	L9	controller near8 transceiver near8 (network near4 (interface or card)) near8 (processor or microcontroller) near8 table	0
☐	L8	l6 NOT l7	7
☐	L7	L6 and TCP/IP	3
☐	L6	L5 and wireless	10
☐	L5	19990318	37
☐	L4	L3 and (network near8 (interface or card))	70
☐	L3	L2 and transceiver	176
☐	L2	L1 and (remote near8 (device or sensor or actuator))	571
☐	L1	site near4 controller	3058

END OF SEARCH HISTORY

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L23: Entry 1 of 4 File: USPT May 16, 2000

DOCUMENT-IDENTIFIER: US 6064318 A
TITLE: Automated data acquisition and processing of traffic information in real-time system and method for same

Application Filing Date (1):
19970611

Brief Summary Text (16):
In a further aspect, the present invention is directed to a method for controlling operation of an automated traffic information monitoring and processing system that includes at least a plurality of sensors for detecting current traffic conditions; at least one variable message device; a plurality of remote station controllers, each operatively connected to corresponding ones of the plurality of sensors and at least one variable message device; and a central system controller operatively located within remote communication range of the plurality of remote station controllers. The method incorporates the steps of receiving traffic condition data from remote station controllers connected to the plurality of sensors, which continuously detect traffic conditions upstream of a work zone or roadway incident; generating traffic advisory data via the central system controller based on the received traffic condition data; then transmitting the traffic advisory data to the plurality of remote station controllers processing the traffic advisory data in each of the plurality of remote station controllers, and displaying traffic advisory messages on at least one variable message device.

Detailed Description Text (4):
An on-site central system controller (CSC) 16 is connected via a conventional communications system to control the various elements of the system 10. To enable the system 10 to respond to traffic conditions in real-time, traffic sensors 18 continuously acquire traffic data at multiple locations within and upstream of the work zone or incident site WZ. Portable ramp metering signals 20 are used to limit access to the roadway during conditions of heavy congestion. Roadside remote stations (RRS) 22 are used to receive traffic data from the sensors 18 and, under control from the CSC 16, to program the VMSs 12 to display and the HAR 14 to broadcast messages appropriate to current traffic conditions. RRSs 22 also control the signal timing of the portable ramp metering signals 20.

CLAIMS:

46. A method for controlling operation of an automated traffic information monitoring and processing system that includes at least a plurality of sensors for detecting current traffic conditions, at least one variable message device, a plurality of remote station controllers each operatively connected to corresponding ones of the plurality of sensors and the at least one variable message device, and a central system controller operatively located within remote communication range of the plurality of remote station controllers, said method comprising the steps of:

relocatably positioning said plurality of sensors upstream of the work zone or roadway incident:

detecting current traffic conditions from said plurality of sensors based on speeds of vehicles in traffic upstream of the work zone or roadway incident;

receiving traffic condition data from remote station controllers connected to the plurality of sensors, the sensors continuously detecting traffic conditions upstream of a work zone or roadway incident in real-time;

generating real-time traffic advisory data via the central system controller based on the received traffic condition data;

transmitting the real-time traffic advisory data to the plurality of remote station controllers;

processing the real-time traffic advisory data in each of the plurality of remote station controllers;

relocatably positioning the at least one variable message device upstream of the work zone or roadway incident;

displaying real-time traffic advisory messages on the at least one variable message device, said traffic advisory messages including at least one of upcoming traffic speed information, traffic time delay information and traffic advisory instruction information; and

configuring locations of said plurality of sensors and said at least one variable message device relative to each other and to the work zone or roadway incident so as to adapt operation of said automated traffic information monitoring and processing system at or near the work zone or roadway incident based on current conditions and location thereof.

48. A method according to claim 46, wherein the automated traffic information monitoring and processing system further includes a plurality of variable message devices each connected to a corresponding one of said plurality of remote station controllers, said step of generating real-time traffic advisory data via the central system controller based on the received traffic condition data including generating real-time traffic advisory data packets specific to each of said plurality of remote station controllers corresponding to said plurality of variable message devices.

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Generate Collection

L23: Entry 2 of 4 File: USPT Feb 8, 2000

DOCUMENT-IDENTIFIER: US 6021664 A
TITLE: Automated groundwater monitoring system and method

Application Filing Date (1):
19980129

Brief Summary Text (20):
U.S. Pat. No. 5,259,450 to Fischer discloses a pumping apparatus containing a vented packer for minimizing the amount of water to be purged from a well prior to obtaining a sample therefrom. In order to activate the pump, however, a field technician must install a removably mountable controller at the well site, and then must be deployed to retrieve collected samples.

WEST Search History

Hide Items | Restore | Clear | Cancel

DATE: Monday, February 02, 2004

Hide?	Set Name	Query	Hit Count
		DB=PGPB,USPT,USOC,EPAB,JPAB,DWPI,TDBD; PLUR=YES; OP=ADJ	
☐	L23	L22 and l1	4
☐	L22	19990318	338
☐	L21	automated adj4 monitoring adj4 system	663
☐	L20	19990318	1
☐	L19	packet near8 checksum near8 (function adj4 code)	2
☐	L18	packet near8 checksum near8 length near8 (function adj4 code)	0
☐	L17	packet near8 data near8 checksum near8 number near8 length near8 (function adj4 code)	0
☐	L16	L13 and l2	1
☐	L15	L13 and l1	5
☐	L14	L13 and l2	1
☐	L13	19990318	107
☐	L12	controller near8 (monitor or monitoring) near8 wireless	313
☐	L11	19990318	1
☐	L10	controller near8 transceiver near8 (network near4 (interface or card)) near8 (processor or microcontroller)	83
☐	L9	controller near8 transceiver near8 (network near4 (interface or card)) near8 (processor or microcontroller) near8 table	0
☐	L8	l6 NOT l7	7
☐	L7	L6 and TCP/IP	3
☐	L6	L5 and wireless	10
☐	L5	19990318	37
☐	L4	L3 and (network near8 (interface or card))	70
☐	L3	L2 and transceiver	176
☐	L2	L1 and (remote near8 (device or sensor or actuator))	571
☐	L1	site near4 controller	3058

END OF SEARCH HISTORY

First Hit Fwd Refs

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L23: Entry 3 of 4 File: USPT Apr 29, 1997

DOCUMENT-IDENTIFIER: US 5625410 A
TITLE: Video monitoring and conferencing system

Application Filing Date (1):
19950407

Brief Summary Text (13):
The present invention implements an automated video monitoring system by way of a PC-based platform employing display windowing software, with camera sources being interfaced to an input circuit board which includes provisions for image data compression. Using a basic image size in pixels of 320.times.240, and optionally including color processing employing a Y-U-V 4:1:1 or 4:2:2 sampling technique, a range of performance standards are established. An economical simultaneous display of 4 sources in a 2.times.2 configuration on a conventional 10" VGA-format (640.times.480 pixels) monitor may be upgraded to a more elaborate 24-source (plus one utility window, which also may be used as a graphical-based input source device for transmitting control commands to the individual cameras) display in a 5.times.5 configuration on a high-resolution 20" (1600.times.1200 pixels) monitor. Other combinations are possible, including arrays of images of size 640.times.480 pixels or even 800.times.600 pixels, depending on the screen size of the display monitor and the capabilities of the video display adapter circuit card. In addition, not all image windows need to be of the same size, nor updated at the same rate, but rather they may be mixed and combined based on particular applications. Remote controls for the individual cameras may be implemented by way of windowing software and/or monitor touch-screen devices. Automatic sensing of particular events (representing security alarms, equipment or process disturbances, or a change in the person speaking in a videoconferencing environment) may be employed to cause reconfiguration by way of resizing the image or modifying the update rate of individual windows on the display screen, or by modifying the data format of recording images on a storage device.

Detailed Description Text (2):
The present invention implements an automated video monitoring system by way of a PC-based platform employing display windowing software, with camera sources being interfaced to an input circuit board which includes provisions for image data compression. The basic video window size of 320.times.240 pixels from each camera source can be displayed on a variety of video monitors, in a number of formats, depending on system complexity. The preferred recording medium is a 4-mm helical-scan data cartridge, commonly referred to as a digital audio tape (DAT). Each tape cartridge is capable of storing 10 GB (gigabytes) of data. All recording times in the explanation below are based a data-compression ratio of 100:1, utilizing a 4:2:2 Y/U/V sampling method for color images. Other higher capacity media, such as 8-mm tapes capable of 20 GB of data storage, may be employed when longer times are desired.

Detailed Description Text (25):
Using the PC-based monitoring system, it is possible to create a video conference that presents a much more natural viewing appearance. As shown in FIG. 13A, a multiple-camera, multiple-display unit 310 preferably is preferably located directly on the conference table 312. This reduces the camera-perspective-

distorting effects just described, because conference members 314 may be seated in a more comfortable and convenient position. The resulting video image is also much more natural. Each controller remote site computer-display section 322 (as described herein below) simultaneously shows all of the members participating in the remote conference, with an individual video window allocated for each participant, under control from the PC-based monitoring system operator. In practice, the remote site equipment operator will select one of the display operating modes as described in FIG. 15, depending on the number of subjects (camera views) and the capabilities of the remote site computer equipment. Optionally, an additional camera 316 fitted with a wide-angle lens will provide an overall view of the conference room, in accordance with more traditional systems.

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L23: Entry 4 of 4 File: DWPI Feb 14, 2002

DERWENT-ACC-NO: 2003-754935
DERWENT-WEEK: 200371

TITLE: Wireless communication network for automated monitoring system, identifies remote devices corresponding to sensor data signal, and provides signal-related data to host computer through wide area network

Basic Abstract Text (1):
NOVELTY - A wireless transceiver (125) transmits original data and repeated data messages with unique identifier and sensor data signal received from remote devices, using predefined communication protocol, to a site controller (150). The controller identifies the remote devices corresponding to data signal, and provides signal-related data to host computer through wide area network (120).

Basic Abstract Text (2):
USE - For use in automated monitoring system used for monitoring and controlling remote devices such as manufacturing apparatus, inventory system, residential system, electric utility system, carbon monoxide detector, door position sensor, heating, ventilating, air conditioning (HVAC) system, lighting system, smoke detector, thermostat, security system, glass break alarm, public telephone booth, cable television set-top box, vending machine, industrial trash compactors, building lift, courier drop box, time clock system, automated teller machine, self-service copier, water treatment plant, coal burning power plant and coke fueled steel plant, through host computer connected to wide area network (WAN), Internet and intranet.

Basic Abstract Text (4):
DESCRIPTION OF DRAWING(S) - The figure shows the block diagram of automated monitoring system.

Basic Abstract Text (5):
automated monitoring system 100

Basic Abstract Text (10):
site controller 150

PF Application Date (1):
19981014